

# Calculus 2

MATH 136-02, MTWF 10:00 - 10:50, Swords 302, Fall 2018

Professor Gareth E. Roberts

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**Office hours:** Mon., Tues., Wed., Fri. 2:00 - 3:00, or by appointment.

**Required Text:** *Calculus: Single Variable (Early Transcendentals)*, third ed., Jon Rogawski and Colin Adams (bundled with WebAssign for \$117.50 in the College bookstore).

**Web page:** <http://mathcs.holycross.edu/~groberts/Courses/MA136/homepage.html>  
Homework assignments, worksheets, class handouts, exam materials, useful links and other important information will be posted at this site. Please bookmark it!

**Is this the right Calculus course for me?** This course is required for students majoring in either Mathematics, Physics, Chemistry, or Economics. It is no longer required for the Biology major or students interested in the health professions. If you have taken Calculus 1 previously or scored a 4 or 5 on the AB advanced placement exam, then this is the appropriate course for you. If you took a strong calculus course in high school, but didn't receive a 4 or 5 on the AP exam, this still may be the correct placement since most of Calculus 1 will be review for you. For more information, visit the *Mathematics Introductory Courses and AP Credit* section of the Math/CS Department's webpage.

**Homework:** There will be homework due every Wednesday 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 0054 8342](http://holycross.edu/00548342). 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. 12th.

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, Jenna Gasparrini (HC '20) will be serving as a modified teaching assistant for the class and will hold her own office hours.

**Computer Labs:** Certain classes will involve the use of technology to illustrate and explore some aspect or application of calculus. These will be days of collaborative learning involving the use of the mathematical software package Maple in the computer lab Haberlin 136. You will be asked to complete 3-4 computer projects working in small groups.

## Course Objectives:

- Develop an understanding for the techniques and theory of one variable calculus.
- Become proficient at making clear and coherent mathematical arguments.
- Learn to work with mathematical software (e.g., Maple) to enhance your understanding.
- Work and communicate with your peers.
- Have FUN while learning calculus!

**Syllabus:** The main focus of this course is to study integration of real-valued functions of a single variable. Applications of the integral, such as volume of revolution, arc length, center of mass, and probability will also be featured. We will discuss infinite series and make a brief foray into the field of differential equations at the end of the course. 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.

A tentative outline of the course is given below. We will cover much of the material in the text from Chapters 5 through 10.

- Course introduction, finding area under a curve (3 classes)
- The definite and indefinite integral (3 classes)
- The Fundamental Theorem of Calculus, net change,  $u$ -substitution (6 classes)
- Exam I
- Applications of integration: present value, area between two curves, volumes of revolution, average value, cylindrical shells (7 classes)
- Techniques of integration: integration by parts, trig substitution, partial fractions, tables (6 classes)
- Improper integrals, approximating definite integrals (3 classes)
- Exam II
- Applications of integration: probability, arc length, center of mass (3 classes)
- Infinite sequences and series: convergence, geometric series, convergence tests ( $n$ th term test, integral, comparison, ratio) (7 classes)
- Power series, Taylor series (4 classes)
- Exam III
- Differential equations: simple examples, separation of variables, Newton’s Law of Cooling, continuously compounded interest (3 classes)
- Differential equations: slope fields, Euler’s method, the logistic equation (3 classes)
- *Calculus Jeopardy* (last class)
- Final Exam

**The Flipped Classroom:** Many 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.

**Exams:** There will be three midterm exams and a comprehensive final at the end of the semester. The exam schedule is given below. We will typically review for each midterm during class the preceding day. 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 approval from the Office of Disability Services (Hogan 215A, x3693).

<b>Exam Schedule:</b>	<b>Exam 1</b>	<b>Wed., Sept. 26</b>	8:00 - 9:30 pm
	<b>Exam 2</b>	<b>Tues., Oct. 30</b>	7:30 - 9:00 pm
	<b>Exam 3</b>	<b>Wed., Nov. 28</b>	7:30 - 9:00 pm
	<b>Final Exam</b>	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 and labs 22%
- 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

