

Math 141 - Calculus I with Mathematica

Course Syllabus

Fall 2017

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Office : Copley 234
Office Hours : MWF 17:00-18:30
drop in and by appointment
Class Time : TR 15:00-17:00
Class Location : Copley 200
Course Webpage : <http://faculty.rmc.edu/edwardburkard/?page=Teaching/141F17>

1. CATALOG COURSE DESCRIPTION

This is a course in differential calculus. Topics to be covered will include: functions; limits and continuity; the definition of the derivative; techniques of differentiation; and applications of the derivative. Note: A working knowledge of high school algebra, geometry, and trigonometry is required for this course. Mathematica will be used as an aid in graphing and exploring functions, and as an aid in computation. Satisfies CAR Computing.

2. PREREQUISITES

The minimum prerequisites for this course are two years of high school algebra and a year of geometry. Trigonometry will be used extensively in this course and will be reviewed very quickly at the beginning of the term. Students who have not studied trigonometry prior to this course will need to work extra hours and come to office hours as needed to master this material.

3. COURSE EXPECTATIONS

Calculus is a difficult course and will require a significant amount of effort and work for most people. However, do not be discouraged by this! In my experience, the statement "I cannot do math" and ones like them are flat out false. For some of you, it may come more easily than others, but this does not mean anyone is innately bad at math (in fact, research backs this up!). What I will ask of you in this class is to give it your best effort and practice regularly. As one of my former teachers would say, "Math is not a spectator sport; you will learn only by doing!"

Please use any and all available resources to help you succeed in this class! I have set office hours, but you are welcome to come by anytime to ask for help. If I'm not otherwise busy, I would love to help you! Also, please use HAC tutoring for help as well! Drop-in tutoring will be available most days of the week in Copley 200 (our classroom) in the evenings. Please visit the HAC's webpage for the tutoring schedule and to schedule appointments with tutors: <http://www.rmc.edu/academics/academic-support>.

4. TEXTBOOK

The required textbook for this class is *Calculus: Early Transcendentals*, 2nd Edition, by Briggs, Cochran, and Gillett. However, I recommend just buying access to the online homework (the cards with the access codes are available at the bookstore), or you can purchase access directly at the MyMathLab website <https://www.pearsonmylabandmastering.com/northamerica/mymathlab/>. My recommendation is to use the trial access and not actually purchase access until you are sure you will stay in the class (you get 2 weeks of trial access). You do not need to buy a physical copy of a textbook as MyMathLab comes with access to an ebook version of this textbook, but if you would like to have a physical textbook, my recommendation would be to buy an older edition of the Calculus textbook by Ron Larson.

5. MATHEMATICA

In this course we will use a very sophisticated computer program called Mathematica to do many of our calculations and to help us learn calculus. Mathematica is a computer algebra system and can probably do any computation you have ever encountered in a mathematics course. We will use the computer as an aid in solving equations, graphing data and functions, visualizing limits, finding derivatives, and generally to simplify calculations and to help us understand Calculus. We will also learn how to use Mathematica to produce polished documents that include text, graphs, and calculations.

Mathematica is provided free to all R-MC students. Directions to download it on your own computer can be found here: <http://www.rmc.edu/departments/mathematics/mathematica>. Mathematica is also available on all college computers. Copley 200 is available for student use in the late afternoon and early evening.

IMPORTANT REMINDER: The computers are not to be used during class time for email, to surf the web, to do online homework, or for any other application that is not a part of the class at that time. It is also inappropriate to use your phone to send or receive messages during class. All these activities are disruptive to the class, distracting and disrespectful to your fellow students and the professor. Inappropriate use of technology during class will cause points to be deducted from your class participation grade.

6. GRADE

There will be 750 total points in this class, distributed as follows:

Item	Homework	Quizzes	Midterms	Final	Attendance	Worksheets	Total
Points	150	90	300	150	20	40	750

Your grade will be determined by the percentage of the total points you've obtained. The grade scale will be no stricter than

Letter	A	B	C	D	F
Cutoff	92%	82%	72%	57%	0%

with +’s and –’s to be used as needed for the final grade only. That is, getting at least 92% will guarantee an A, getting at least 82% will guarantee a B, getting at least 72% will guarantee a C, and getting at least 57% will guarantee a D.

6.1. **Exams.** There will be 3 midterm exams for this class. The exam dates are September 26th, October 24th, and November 21st. Each midterm exam will be worth 100 points. The final is worth 150 points and is on Thursday, December 14th at 8:30am. Most exam problems will closely resemble those of the homework and quizzes. Missed exams may only be made up with an appropriately excused absence. If you are extremely ill and unable to attend an exam you must call or email me **before** the exam and let me know the situation. An unexcused absence from an exam, including the final exam, will result in a score of zero on that exam.

6.2. **Quizzes.** There will be a quiz every Tuesday, except for exam days and the Tuesday after Thanksgiving break. There will also be a quiz the Thursday after Fall Break (October 19th). Each quiz will be worth 15 points and will be 15 minutes long. On most quizzes, you will be allowed/required to use Mathematica, however some quizzes will be technology-free. You must always show all of your work on quizzes. There will be a total of 9 quizzes and the lowest 3 will be dropped. For this reason, no make-up quizzes will be given.

6.3. **Homework.** We will use the MyMathLab system for homework, available here: <https://www.pearsonmylabandmastering.com/northamerica/mymathlab/>. To sign up for our class, use the Course ID: **burkard59074**. Homework will be assigned every day of class in which new material is covered (a total of 21 assignments). The 3 homework assignments with the lowest score will be dropped. You will be allowed to submit homework assignments late, however you will lose 20% of the credit for uncompleted problems for each day it is late. Each assignment will be due the Tuesday after it is assigned at 2pm (you can see the due dates on assignments in MyMathLab). Homework will be worth a total of 150 points.

6.4. **Worksheets.** Every Thursday, with the exception of Thursdays after exams, we will spend the second half of the class on a worksheet to practice and reinforce the topics we have covered that week. There will be a total of 10 worksheets and each will be worth 5 points. The lowest 2 scores will be dropped. The score on worksheets will be based on actively working on them in class and completion of the worksheet. Solutions to the worksheets will be posted after worksheets are collected.

6.5. **Attendance.** You will receive 1 point each day you are in class on-time and participating, except for exam days. You are allowed 3 unexcused absences before your attendance score is affected (the lowest 3 out of 23 scores will be dropped), but excessive absences will adversely affect other areas of your grade.

7. COURSE OUTLINE

Here is a tentative day-by-day outline of topics to be covered. We may deviate slightly from this as the semester goes on, but this should give you a general outline.

- (Sep 5)
 - Introduction
 - Mathematica
 - Prerequisite Assessment
- (Sep 7)
 - 1.1 - Review of Functions
 - 1.2 - Representing Functions
- (Sep 12)
 - QUIZ 1
 - 1.3 - Inverse, Exponential, and Logarithmic Functions
- (Sep 14)
 - 1.4 - Trigonometric Functions and Their Inverses
- (Sep 19)
 - QUIZ 2
 - 2.1 - The Ideas of Limits
 - 2.2 - Definitions of Limits
 - 2.3 - Techniques for Computing Limits (Limit Laws and limits of linear, polynomial, and rational functions)
- (Sep 21)
 - 2.3 - Techniques for Computing Limits (One-sided limits, finding limits by factoring and using conjugates, and the Squeeze Theorem)
- (Sep 26)
 - EXAM I: Sections 1.1-2.3
- (Sep 28)
 - 2.4 - Infinite Limits
 - 2.5 - Limits at Infinity (Horizontal asymptotes, infinite limits at infinity, and end behavior)
- (Oct 3)
 - QUIZ 3
 - 2.5 - Limits at Infinity (More end behavior)
 - 2.6 - Continuity
- (Oct 5)
 - 3.1 - Introducing the Derivative
- (Oct 10)
 - QUIZ 4
 - 3.2 - Working with Derivatives
 - 3.3 - Rules of Differentiation
- (Oct 12)
 - 3.4 - The Product and Quotient Rules
- (Oct 17)
 - FALL BREAK
- (Oct 19)
 - QUIZ 5
- (Oct 24)
 - EXAM II: Sections 2.4-3.4
- (Oct 26)
 - 3.5 - Derivatives of Trigonometric Functions
 - 3.6 - Derivatives as Rates of Change (One-dimensional motion, growth models)
- (Oct 31)
 - QUIZ 6
 - 3.6 - Derivatives as Rates of Change (Economics and Business applications)
 - 3.7 - The Chain Rule
- (Nov 2)
 - 3.8 - Implicit Differentiation
- (Nov 7)
 - QUIZ 7
 - 3.9 - Derivatives of Logarithmic and Exponential Functions
 - 3.10 - Derivatives of Inverse Trigonometric Functions (Derivatives of inverse functions in general)
- (Nov 9)
 - 3.10 - Derivatives of Inverse Trigonometric Functions
- (Nov 14)
 - QUIZ 8

- 3.11 - Related Rates
- 4.1 - Maxima and Minima (Absolute maxima and minima and the Extreme Value Theorem)
- (Nov 16) • 4.1 - Maxima and Minima
- (Nov 21) • EXAM III
- (Nov 23) • THANKSGIVING BREAK
- (Nov 28) • 4.2 - What Derivatives Tell Us
- 4.3 - Graphing Functions (Graphing guidelines)
- (Nov 30) • 4.3 - Graphing Functions
- (Dec 5) • QUIZ 9
- 4.4 - Optimization Problems
- 4.6 - Mean Value Theorem (Rolle's Theorem)
- (Dec 7) • 4.6 - Mean Value Theorem

8. DISABILITY

Randolph-Macon College is committed to providing access to programs and services for qualified students with disabilities. If you are a student with a disability and require accommodations to participate and complete requirements for this course, notify me immediately and contact the Disability Support Services Office (DSS@rmc.edu or 804-752-7343) for verification of eligibility and determination of specific accommodations.

9. CODE OF ACADEMIC INTEGRITY

Your compliance with the Code of Academic Integrity is assumed at all times in this class. This includes, but is not limited to, submitting your own work (even if you work together on assignments) and not cheating on exams. Please make sure you have read and understand this, which can be found here: <https://issuu.com/rmcstudentlife/docs/fishtales/2?ff=true&e=6746978/38436627>

10. CONDUCT

You are expected to act in a respectable manner. If you are disruptive, you will be asked to leave. If you have a cell phone, please turn it off (or at least place it on silent) during class time. Lectures being interrupted by cell phones going off is disrespectful to everyone in the classroom. You may use a laptop for taking notes or for looking at the lecture notes, but otherwise browsing the internet is unacceptable.

Material in the syllabus may be changed in the event of an unforeseen event (for example: emergencies, school closures). Any changes will be announced in class with a discussion of reasons why.