

# MATH 121, Fall 2017: Calculus I

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Class Meetings Mondays, Wednesdays, Fridays: 9:40 – 10:40 AM in Life Science 307

Office Hours Mondays 2:30 - 3:30 PM Tuesdays  
 1:00 - 2:00 PM Wednesdays  
 2:30 - 3:30 PM Thursdays  
 10:30 - 11:30 AM and by  
 appointment (email me)

Course Information This course provides an introduction to Calculus, including the study of limits, derivatives, graphing, and beginning integration. A focus of the course will be the use of technology as a tool and learning aid.

Intended Learning Outcomes By the end of this course, students will be able to:

- apply techniques of differentiation and integration to model and solve problems.
- understand the role of Calculus and the infinitesimal in modern mathematics.
- understand the concepts behind limits, derivatives, and integrals.
- recognize the role of technology in Calculus, understand when it should be used, and be aware of its limitations.

Required Materials Textbook: *Calculus: Early Transcendental Functions*; Smith and Minton, 4th Edition  
 Calculator: TI-83 Calculator, or similar (with graphing capabilities)  
 Computer: A laptop computer with Mathematica installed, or access to Mathematica.

Course Grades The following table lists the weights for the various forms of assessment for this class.

Homework/Quizzes	25%
Technology Assignments	10%
Tests	45%
Final Exam	20%

A grade scale will be determined after final grades are computed, but will be no worse than the scale given below. Attendance and class participation will be considered when determining marginal grades.

	B+	87-89	C+	77-79	D+	67-69		
	A	93-100	B	83-86	C	73-76	D	63-66
	A-	90-92	B-	80-82	C-	70-72	D-	60-62
Expected Work Hours							F	0-59

This course expects you to spend at least 12 hours of work each week inside and outside of class.

## Academic Integrity

Students are expected to adhere to the Academic Integrity policies of Roanoke College. All work submitted for a grade is to be your own work! No collaboration is allowed on quizzes or tests. Unless otherwise stated, you may work together on the homework, but should write up your solutions separately.

Cell phones must be turned off prior to entering the classroom. Laptops may be used for note-taking during regular class sessions, if this seems useful to you, but you may not log on to the internet or to an email server unless specifically told to do so. The use of laptops and other electronic devices during an exam is strictly prohibited. This includes tablets, smart phones, and iPods. Any use of such devices during a quiz or exam will be considered a breach of academic integrity. Note that looking at or using your cell phone during a test or quiz is considered a violation of Academic Integrity regardless of your purpose or intent in doing so.

## Problem Sets

A problem set will be due each Friday (excluding week 1) that we do not have a test. These will be assigned on the previous Friday and each are worth a total of 25 points. There are two parts to each problem set. The first part is worth 10 points and will be graded based on effort and completeness. This part consists of the three daily homework assignments for the previous three class periods. Daily homework will include roughly 10 problems and you are welcome to ask questions about them at the beginning of class. The second part of each problem set is worth 15 points and will be graded based on correctness and presentation. Each week you will complete 3 problems which will be carefully graded. Each of these problems is worth 5 points, with 4 points for correctness and 1 point for presentation.

For the first week we will have a single problem assigned on Friday, due Monday, to get you accustomed to the grading; it will be worth 10 points.

When you turn in your problem set on Friday, make sure the three problems graded for correctness are on top and then below are your three daily assignments. Your homework should be neat, organized, and stapled. No late homework will be accepted and solutions will be posted on the following Monday. You can collaborate on problem sets but you must write up your own solution. If you are looking at another person's work when you are writing up your problem set, then you are in violation of the academic integrity policy of Roanoke College.

## Reflections

As part of the homework grade, there will be 4 reflections assigned during the semester. You can find the prompts on Inquire and upload your responses there as well. They are worth 10 points each and will be graded on how thoughtful and complete you are.

## Quizzes

There may also be written quizzes in this class. They may either be in-class quizzes or take-home quizzes. I may occasionally warn you about an upcoming quiz but you should be prepared to take a quiz on any given day.

## Technology Assignments

We will be using the powerful software package Mathematica throughout class to help emphasize calculus concepts over needing to compute, say, derivatives and integrals by hand every time we need them. This software will let us spend more time on the "how and why" of calculus and what it can potentially be used for in the future. As part of this class, we will spend a few full days using this technology, done as a combination class discussion, work with a partner, and homework. These assignments will be worth a good portion of your final grade.

## Tests and Final

Four tests will be given throughout the semester according to the schedule on the last page of this syllabus (any changes from this schedule will be announced well in advance). Each test will focus on the material learned since the last test, but as with most mathematics classes, the exam will necessarily require you to understand and remember things from

the past. The final exam will be comprehensive and given during the scheduled time for the final exam for our class.

MCSP  
Conversations

The MCSP Department offers a series of discussions that appeal to a broad range of interests related to these fields of study. These co-curricular sessions engage the community to think about ongoing research, novel applications and other issues that face our discipline.

Members of this class are invited to be involved with all of these meetings; however participation in at least **two** of these sessions is mandatory. After attending, submit a one page paper reflecting on the discussion. This should not simply be a regurgitation of the content, but rather a personal contemplation of the experience. This reaction paper will be counted as a quiz and should be uploaded to Inquire using the appropriate link. If you are caught leaving the talk early or being disruptive, you will receive a 0 on the assignment.

Attendance & Make-  
Up Work

Attendance is critical to the understanding of the material in the course; it is both required and expected. Any absence that is not discussed with the instructor prior to the missed class is considered unexcused. I will assume that if you accumulate 4 unexcused absences you are not interested in completing the course. After the 3rd unexcused absence, you, your advisor, and the registrar will be warned that another absence will result in your removal from the class (DF).

*When absent, excused or unexcused, you are responsible for all material covered in class. You will not be allowed to make up any work missed due to an unexcused absence.*

Study Room

The MCSP Study Room, Trexler 271, can be used by you and your friends to meet up so that you can work on homework together or prepare for tests. It is open virtually 24 hours a day, 7 days a week (very occasionally there are meetings in that room). Your student ID card should grant you access to Trexler Hall any time of day if the doors happen to be locked (use the card access point located by the first floor entrance facing the parking lot). Take advantage of this area and time, especially during weekdays when I and the other faculty teaching calculus are around!

Community

Please feel free to become an active member of our department's community. Each of the three disciplines in our department has a student club and you should join! The Roanoke College Student Chapter of the Mathematical Association of America (or "Math Club" for short) meetings every other week, plays and learns about games and hosts evening events and the annual Pi-Day celebration!

In addition, our department offers MCSP Tea every week on Wednesdays from 3 to 4pm; come by Trexler 271 to talk to and meet other students as well as chat with the MCSP faculty members in a casual setting!

The Office of  
Disability  
Support Services

is located in the Goode-Pasfield Center for Learning and Teaching in Fintel Library. DSS provides reasonable accommodations to students with documented disabilities. To register for Disability Support Services, students must self-identify to the Office of Disability Support Services, complete the registration process, and provide current documentation of a disability along with recommendations from the qualified specialist. Please contact JoAnn Stephens-Forrest, MSW, Coordinator of Disability Support Services, at 540-3752247 or e-mail her at: [stephens@roanoke.edu](mailto:stephens@roanoke.edu) to schedule an appointment. If you have registered with DSS in the past, and would like to receive academic accommodations for this semester, please contact Ms. Stephens-Forrest at your earliest convenience, to schedule an appointment.

Wed	Aug 30		Preview; Small Group Discussion
Fri	Sept 1	1.2, 1.3	The Concept and Computation of Limits
Mon	Sept 4	1.4	Continuity and its Consequences
Wed	Sept 6	1.5	Limits Involving Infinity
Fri	Sept 8	1.6	Formal Definition of the Limit
Mon	Sept 11	2.1, 2.2	Tangent Lines and Velocity; The Derivative
Wed	Sept 13	2.3, 2.4	Derivative Rules Day #1
Fri	Sept 15	2.5	Derivative Rules Day #2
Mon	Sept 18	2.6, 2.7	Derivative Rules Day #3
Wed	Sept 20		<b>Review</b>
Fri	Sept 22		<b>Test 1</b>
Mon	Sept 25	2.8	Implicit Differentiation
Wed	Sept 27	2.10	The Mean Value Theorem
Fri	Sept 29	3.1	Linear Approximation, Newton's Method
Mon	Oct 2	3.2	L'Hopital's Rule, Indeterminate Forms
Wed	Oct 4	3.3, 3.4	Increasing and Decreasing Functions; Maximums/Minimums
Fri	Oct 6		Technology Day #1: Derivatives in Mathematica
Mon	Oct 9	3.5, 3.6	Concavity and Curve Sketching
Wed	Oct 11		<b>Review</b>
Fri	Oct 13		<b>Test 2</b>
<b>Fall Break!</b>			
Mon	Oct 23	3.7	Optimization Day #1
Wed	Oct 25	3.7	Optimization Day #2
Fri	Oct 27	3.8	Related Rates Day #1
Mon	Oct 30	4.1	Antiderivatives
Wed	Nov 1	4.2, 4.3	Sums and Area
Fri	Nov 3		Technology Day #2: Numerical Integration, Detailed Sums
Mon	Nov 6	4.4	The Definite Integral
Wed	Nov 8		<b>Review</b>
Fri	Nov 10		<b>Test 3</b>
Mon	Nov 13	4.5	The Fundamental Theorem of Calculus
Wed	Nov 15	4.6	Integration by Substitution
Fri	Nov 17	5.1	Area Between Curves
Mon	Nov 20	5.2	Volume (Disks/Washers) <b>Thanksgiving Break</b>
Mon	Nov 27	5.4	Arc Length and Surface Area
Wed	Nov 29	6.2	Integration by Parts
Fri	Dec 1	6.6	Improper Integrals
Mon	Dec 4		<b>Review</b>
Wed	Dec 6		<b>Test 4</b>

Course Schedule

Fri Dec 8

**Review**

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Wed Dec 13

**Final Exam: 8:30 AM - 11:30 AM**

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