

Math 121: Calculus I

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Office Hours Monday 10:30 - 11:30 am, Tuesday 11:30 am - 1 pm, Wednesday 1:15 - 2:30 pm or by appointment.

Course Description This course provides an introduction to calculus, including the study of limits, derivatives, graphing, and beginning integration. The course will also use technology (in particular Mathematica) as a learning aid.

Learning Outcomes By the end of the course, successful 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

Course Materials

Textbook: *Calculus: Early Transcendental Functions* Smith and Minton, 4th edition

Devices: Graphing calculator, access to a computer with Mathematica

Important Dates

We will have six in-class tests and a final exam. Each test will focus on the material learned since the last test, but will (necessarily) contain previous material. The final will be comprehensive. **If you have a conflict with one of these dates please email me ASAP.**

Test 1	Friday 9/17, in class
Test 2	Friday 10/1, in class
Test 3	Friday 10/15, in class
Test 4	Friday 11/5, in class
Test 5	Monday 11/22, in class
Test 6	Friday 12/10, in class
Final Exam	Friday 12/17, 2 - 5 pm

Course Grades

The final course grade is determined in the following way:

Homework & Activity Responses	36%
Recitation 10% Tests (7% each)	42%
Final Exam	12%

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	F 0-59
A-	90-92	B-	80-82	C-	70-72	D-	60-62	

Homework

There will be a graded homework problem assigned each class and due by the beginning of the next class. **Late homework will not be accepted.** Submit your homework (as a PDF or Word file) using the links on Inquire. I am happy to help with these problems, but you **may not** work on them with anyone else.

Co-Curricular Activities The MCSP department and Roanoke College offer many opportunities to engage with mathematical ideas outside of classes. Members of this class are encouraged to attend many of these activities, however attending at least one is mandatory. Examples include MCSP Conversation Series talks and student research showcases - if you're unsure if a given activity makes sense for this purpose, please

email me to ask. Within one week of attendance you must submit a brief response to the activity. Your response will count as part of your homework grade.

Recitation

You must be enrolled in a recitation section (Math 121R) in addition to Math 121. In recitation, you will review important concepts needed for calculus (such as trigonometry, exponential and logarithmic functions, and graphing) as well as practice with new calculus concepts. Math 121R operates as a separate course, but it counts as 10% of the course grade for Math 121. Please consult your recitation course syllabus for additional information on policies and grading.

Daily Problems

After each section I will assign some problems from the book for practice. These will not be collected – the answers are in the back and they are your chance to make sure you understand the material and to get help if you realize you need it. Feel free to work with other students on these problems.

Attendance Policy

Class attendance is expected. However, if you have a temperature of 100.4 or higher or other coronavirus symptoms, don't come to class. Call Health Services IMMEDIATELY. Do not come to class or go to any public area on campus. In order for your absence to be excused, you must give Health Services permission to notify me that you have consulted them about coronavirus symptoms. All absences caused by consultation with Health Services about coronavirus symptoms will be treated as if you'd discussed them with me beforehand. **If your absence is not coronavirus related and you have not discussed it with me beforehand, you will be unable to make up any work missed. Whatever the reason, if you have to miss class, you are responsible for learning all material covered that day.** If Health Services informs you that you should isolate and not attend class for multiple days or weeks, inform me so that we can make a plan to keep you current in the course.

Mask Policy

Until the college changes its policy, face coverings/masks must be worn over the mouth and nose by all students and instructors in classrooms and hallways of academic buildings. **Students who come to class without a face mask that is being worn properly will be asked to leave and will be readmitted only after they are wearing one.**

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

Electronic Devices You can use **only** your graphing calculator during class. (This means no cell phones - please set them on silent and leave them in your bag.)

Extra Resources Subject tutoring is available through the Center for Teaching and Learning (in Fintel Library).

Special Needs

If you have a disability that may require an accommodation in this course, please let me know and provide your documentation within the first 2 weeks of the semester. I must have your documentation at least 48 hours prior to any accommodation I make. (Check with the Center for Teaching and Learning for their scheduling guidelines.)

Academic Integrity I expect all of you to follow the Academic Integrity policies of Roanoke College. All graded work should be your own work! If you ever have questions about how these policies apply to our class please contact me. Any violations of these policies will automatically be turned over to the Academic Integrity Council.

Pandemic Planning If college policies change due to the pandemic, I will distribute an updated syllabus. I will email you our new plan and post details on Inquire. You should email me with any questions or challenges that arise.

Course Schedule

The following schedule is approximate and subject to change except for the test dates. It should give you an idea of the timing of the topics covered and assignments.

Day	Date	Topic	121R Topic
W	S 1	1.1: Preview of Calculus	
F	S 3	1.2: Intro to Limits	Test-out Quizzes
M	S 6	1.3: Computing Limits	
W	S 8	Intro to Mathematica	
F	S 10	1.4: Continuity	Factoring, Cancelling, Fractions
M	S 13	1.5: Limits with Infinity	
W	S 15	2.1: Tangent Lines and Velocity	
F	S 17	Test 1	Lines, Exponent Rules
M	S 20	2.2: Derivatives	
W	S 22	2.3: Computing Derivatives / 2.4: Product and Quotient Rules	
F	S 24	2.5: Chain Rule	$\sin(x)$, $\cos(x)$, $\tan(x)$
M	S 27	2.6: Trig Derivatives / 2.7: Exponential Derivatives	
W	S 29	Derivative Review	
F	O 1	Test 2	a^x , $\ln(x)$
M	O 4	Derivatives in Mathematica	
W	O 6	3.2: L'Hopital's Rule	
F	O 8	3.3: Maximums and Minimums	Solving $f(x) = 0$
M	O 11	3.4: Increasing and Decreasing Functions	
W	O 13	3.5: Concavity / 3.6: Curve Sketching	
F	O 15	Test 3	Derivative Review
		Fall Break	
M	O 25	3.1: Linear Approximation	
W	O 27	2.8: Implicit Differentiation	
F	O 29	3.8: Related Rates	Right Triangles, Geometry
M	N 1	3.7: Optimization	
W	N 3	3.7: Optimization	
F	N 5	Test 4	Optimization Review
M	N 8	4.1: Antiderivatives	
W	N 10	4.2: Sums	
F	N 12	4.3: Area	Sums
M	N 15	4.4: The Definite Integral	
W	N 17	4.5: The Fundamental Theorem of Calculus	
F	N 19	Integration in Mathematica	Integral Review

M	N 22	Test 5 Thanksgiving Break	
M	N 29	4.6: Integration by Substitution	
W	D 1	Integration Review	
F	D 3	7.1: Modeling with Differential Equations	$a^x, \ln(x)$
M	D 6	7.2: Separable Differential Equations	
W	D 8	Review	
F	D 10	Test 6	Review
F	D 17	Final Exam	2 - 5 pm