Math 121: Calculus I

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Student Help Hours / Office Hours **Monday and Wednesday 10 - 10:45 am, Wednesday and Friday noon - 1 pm**, or by appointment. (No need for an appointment if you come during office hours)

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 9/12, in class**
Test 2	**Friday 9/26, in class**
Test 3	**Friday 10/10, in class**
Test 4	**Friday 10/31, in class**
Test 5	**Monday 11/17, in class**
Test 6	**Wednesday 12/3, in class**
Final Exam	**Tuesday 12/9, 8:30 − 11:30 am**

Course Grades The final course grade is determined in the following way:

Homework	**30%**
Recitation	**10%**
Tests (8% each)	**48%**
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		

Attendance Policy Class attendance is expected because doing well in this class is hard if you aren't here to work on the material with us. However, life happens and sometimes you have to miss. If you know in advance you're going to miss class, make sure you turn in any work due that day (Inquire makes this easy!). Let me know if you need help learning the material we're going to cover, whether that means getting connected with someone who will share their notes or coming to office hours with questions. If you are going to miss a test, let me know as soon as you can so we can figure out how to handle that. If you don't know in advance (because sometimes life happens unexpectedly), talk with me as soon as you can about what you can make up and how to get caught up. I will be as generous as I can while still keeping the class fair for all students.

Homework I will assign a graded homework problem each day. Submit your homework in class OR via Inquire as a PDF or Word file. (Picture files may not allow me to give you comments, so copy/paste pictures into Word or get a PDF scanner app on your phone.) These problems are due at the beginning of the next class so you can ask questions about them before we start new material. **Since I can't accept homework turned in after we've discussed it in class, late homework will usually not be accepted.** If you are unable to complete the homework on time for some reason, please contact me about that as soon as you can so we figure out how to handle the situation. I am happy to help with these problems, but **you may not work on them with anyone but me**.

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.

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.

Mask Policy While face coverings/masks are no longer required, anyone is welcome to wear a mask for some or all of the semester. **If you feel sick and plan to come to class, please wear a mask over your nose and mouth!** (The rest of the class thanks you in advance.)

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

Extra Resources Subject tutoring is available Sunday - Thursday from 4 - 9 pm at the Dr. Sandee McGlaun Writing Center and Subject Tutoring (in the lower level of Fintel Library). Stop by or schedule an appointment through Navigate ("Schedule an Appointment" → "Writing Center and Subject Tutoring" → "Writing Support" or "Course Tutoring" → preferred date and tutor.) Contact subject_tutoring@roanoke.edu or 540-375-2590 for more information.

Accommodations If you get any academic accommodations in this course, please let me know and provide your documentation as soon as you can - preferably within the first 2 weeks of the semester. (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.

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	A 27	1.1: Preview of Calculus	
F	A 29	1.2: Intro to Limits	Test-out Quizzes
M	S 1	1.3: Computing Limits	
W	S 3	1.4: Continuity	
F	S 5	1.5: Limits with Infinity	Factoring, Cancelling, Fractions
M	S 8	2.1: Tangent Lines and Velocity	
W	S 10	Intro to Mathematica	
F	S 12	**Test 1**	Lines, Exponent Rules
M	S 15	2.2: Derivatives	
W	S 17	2.3: Computing Derivatives / 2.4: Product and Quotient Rules	
F	S 19	2.5: Chain Rule	$\sin(x)$, $\cos(x)$, $\tan(x)$
M	S 22	2.6: Trig Derivatives / 2.7: Exponential Derivatives	
W	S 24	Derivative Review	
F	S 26	**Test 2**	a^x, $\ln(x)$
M	S 29	Derivatives in Mathematica	
W	O 1	3.2: L'Hopital's Rule	
F	O 3	3.3: Maximums and Minimums	Solving $f(x) = 0$
M	O 6	3.4: Increasing and Decreasing Functions	
W	O 8	3.5: Concavity / 3.6: Curve Sketching	
F	O 10	**Test 3**	Derivative Review
		Fall Break	
M	O 20	3.1: Linear Approximation	
W	O 22	2.8: Implicit Differentiation	
F	O 24	3.8: Related Rates	Right Triangles, Geometry
M	O 27	3.7: Optimization	
W	O 29	3.7: Optimization	
F	O 31	**Test 4**	Optimization Review
M	N 3	4.1: Antiderivatives	
W	N 5	4.2: Sums	
F	N 7	4.3: Area	Sums
M	N 10	4.4: The Definite Integral	
W	N 12	4.5: The Fundamental Theorem of Calculus	
F	N 14	Integration in Mathematica	Integral Review
M	N 17	**Test 5**	
W	N 19	4.6: Integration by Substitution	
F	N 21	Integration Review	a^x, $\ln(x)$
M	N 24	7.1: Modeling with Differential Equations	
		Thanksgiving Break	
M	D 1	7.2: Separable Differential Equations	
W	D 3	**Test 6**	
F	D 5	Review	Review
Tu	D 9	**Final Exam** 8:30 – 11:30 am	