MATH 121, Fall 2016: Calculus I

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Class Meetings

Mondays, Wednesdays, Fridays: 10:50 – 11:50 AM in Trexler 374
This course expects you to spend at least 12 hours of work each week inside and outside of class.

Office Hours

Mondays	8:45 – 9:45 AM
Tuesdays	11:00 AM – 12:00 PM
Wednesdays	9:30 – 10:30 AM
Thursdays	11:00 AM – 12:00 PM

and by appointment (email me)

Course Information

This course provides and 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	30%
Technology Assignments	10%
Tests (10% each)	40%
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	F	0-59
A-	90-92	B-	80-82	C-	70-72	D-	60-62		

Reading and Participation

The key to learning a topic in mathematics is participation. We will strive to have an active, rather than passive, classroom environment. The last page of the syllabus is a day by day outline of the sections that will be discussed in class. You are fully expected to have read the upcoming section **before** the class meeting and have questions ready to be asked as we develop and learn the material together.

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.

Homework

Homework will be assigned regularly in this class (virtually every class period). It will be due at the start of the class period immediately following the assigning of homework. Around three problems will be graded for correctness (for 6 points total), and the re-mainder will be graded for completion (for 4 additional points). Mathematica software may be used in some fashion for some of the questions but please indicate on your home-work where Mathematica was used and either attach a printed notebook, email me your notebook, or indicate what commands you used.

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 Block 3: December 13, 8:30 – 11:30 AM.

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 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.
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! Membership in our Math Club also grants membership into the MAA itself; one of the premiere professional mathematical organizations in the world.
	In addition, our department offers a weekly tea time for students and faculty; feel free to stop by the MCSP Study Lounge (Trexler 271) for tea and cookies on Thursdays from 2:30 PM to 3:30 PM. Come meet other students as well as chat with the MCSP faculty members in a casual setting!

Tentative Course Schedule

	Date	Section	Topic
Wed	Aug 31		Preview; Small Group Discussion
Fri	Sept 2	1.2, 1.3	The Concept and Computation of Limits
Mon	Sept 5	1.4	Continuity and its Consequences
Wed	Sept 7	1.5	Limits Involving Infinity
Fri	Sept 9	1.6	Formal Definition of the Limit
Mon	Sept 12	2.1, 2.2	Tangent Lines and Velocity; The Derivative
Wed	Sept 14	2.3, 2.4	Derivative Rules Day #1
Fri	Sept 16	2.5	Derivative Rules Day #2
Mon	Sept 19	2.6, 2.7	Derivative Rules Day #3
Wed	Sept 21		**Review**
Fri	Sept 23		**Test 1**
Mon	Sept 26	2.8	Implicit Differentiation
Wed	Sept 28	2.10	The Mean Value Theorem
Fri	Sept 30	3.1	Linear Approximation, Newton's Method
Mon	Oct 3	3.2	L'Hôpital's Rule, Indeterminate Forms
Wed	Oct 5	3.3, 3.4	Increasing and Decreasing Functions; Maximums/Minimums
Fri	Oct 7		Technology Day #1: Derivatives in Mathematica
Mon	Oct 10	3.5, 3.6	Concavity and Curve Sketching
Wed	Oct 12		**Review**
Fri	Oct 14		**Test 2**
		Fall Break	
Mon	Oct 24	3.7	Optimization Day #1
Wed	Oct 26	3.7	Optimization Day #2
Fri	Oct 28	3.8	Related Rates Day
Mon	Oct 31	4.1	Antiderivatives
Wed	Nov 2	4.2, 4.3	Sums and Area
Fri	Nov 4		Technology Day #2: Numerical Integration, Detailed Sums
Mon	Nov 7	4.4	The Definite Integral
Wed	Nov 9		**Review**
Fri	Nov 11		**Test 3**
Mon	Nov 14	4.5	The Fundamental Theorem of Calculus
Wed	Nov 16	4.6	Integration by Substitution
Fri	Nov 18	5.1	Area Between Curves
Mon	Nov 21	5.2	Volume (Disks/Washers)
		Thanksgiving Break	
Mon	Nov 28	5.4	Arc Length and Surface Area
Wed	Nov 30	6.2	Integration by Parts
Fri	Dec 2	6.6	Improper Integrals
Mon	Dec 5		**Review**
Wed	Dec 7		**Test 4**
Fri	Dec 9		**Review for Final**
Tue	Dec 15		**Final Exam: 8:30 AM - 11:30 AM**