MATH 121A, Fall 2015: Calculus I

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Class Meetings Mondays, Wednesdays, Fridays: 9:40 AM - 10:40 AM in Trexler 374

Office Hours
Mondays, Wednesdays: 1:30 PM - 3:00 PM
Tuesdays: 9:30 AM - 10:30 AM, 1:30 PM - 3:00 PM
Thursdays: 1:30 PM - 3:00 PM
and by appointment (email me; take advantage of this, as because of chairperson duties, regularly scheduled office hours may occasionally be shortened or canceled)

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.
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. A few problems will be collected and graded for correctness (at 3 points) and the remainder will be graded for completion (at 2 points) for a total of 5 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 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 will engage the community to think about ongoing research, novel applications and other issues that face our discipline. You are invited be involved with all of these meetings; however participation in at least two of these sessions is mandatory. After attending, students will 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. These reaction papers will be counted as a quiz and must be submitted using the links found on our Inquire page.
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. 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! 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 MCSP Tea every week so 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 time is yet to be determined and will be posted on flyers around Trexler Hall and also advertised in 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 electronic devices other than your graphing calculator or iClicker can be used during any class or testing period (this includes cell phones; please silence or turn them **off** before class). 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.
Course Work Load	At a bare minimum, this course expects you to spend at least 12 hours of work each week inside and outside of class.

Course Schedule

Wed	Sept 2		Preview; Small Group Discussion
Fri	Sept 4	1.2, 1.3	The Concept and Computation of Limits
Mon	Sept 7	1.4	Continuity and its Consequences
Wed	Sept 9	1.5	Limits Involving Infinity
Fri	Sept 11	1.6	Formal Definition of the Limit
Mon	Sept 14	2.1, 2.2	Tangent Lines and Velocity; The Derivative
Wed	Sept 16	2.3, 2.4, 2.6	Derivative Rules Day #1
Fri	Sept 18	2.5, 2.6, 2.7	Derivative Rules Day #2
Mon	Sept 21		**Review**
Wed	Sept 23		**Test 1**
Fri	Sept 25	2.8	Implicit Differentiation
Mon	Sept 28	2.10	The Mean Value Theorem
Wed	Sept 30	3.1	Linear Approximation, Newton's Method
Fri	Oct 2	3.2	L'Hôpital's Rule, Indeterminate Forms
Mon	Oct 5	3.3, 3.4	Increasing and Decreasing Functions; Maximums/Minimums
Wed	Oct 7	3.5, 3.6	Concavity and Curve Sketching
Fri	Oct 9		Technology Day #1: Introduction to and Derivatives in Mathematica
Mon	Oct 12		**Review**
Wed	Oct 14		**Test 2**
Fri	Oct 16	3.8	Related Rates Day
			Fall Break
Mon	Oct 26	3.7	Optimization Day #1
Wed	Oct 28	3.7	Optimization Day #2
Fri	Oct 30	4.1	Antiderivatives
Mon	Nov 2	4.2, 4.3	Sums and Area
Wed	Nov 4	4.4	The Definite Integral
Fri	Nov 6		Technology Day #2: Numerical Integration, Detailed Sums
Mon	Nov 9		**Review**
Wed	Nov 11		**Test 3**
Fri	Nov 13	4.5	The Fundamental Theorem of Calculus
Mon	Nov 16	4.6	Integration by Substitution
Wed	Nov 18	5.1	Area Between Curves
Fri	Nov 20	5.2	Volume (Disks/Washers)
Mon	Nov 23	5.4	Arc Length and Surface Area
			Thanksgiving Break
Mon	Nov 30	6.2	Integration by Parts
Wed	Dec 2	6.2	Integration by Parts
Fri	Dec 4	6.6	Improper Integrals
Mon	Dec 7		**Review**
Wed	Dec 9		**Test 4**
Fri	Dec 11		**Review for Final**
Wed	Dec 16		**Final Exam: 8:30 AM - 11:30 AM**