

MATH 121B, Fall 2015: Calculus I

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| Instructor | Dr. Adam Childers Trexler Hall 270G Email: childers@roanoke.edu | Phone: (540) 375-2449 Fax: (540) 375-2561 Web: see Inquire (inquire.roanoke.edu) |
| Class Meetings | Mondays, Wednesdays, Fridays: 10:50 AM - 12:00 PM in Trexler 374 | |
| Office Hours | Mondays, Wednesdays, and Fridays: 12:00 PM - 1:00 PM Thursdays: 11:00 AM - 12:00 PM and by appointment | |
| 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: <ul style="list-style-type: none">• 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: <i>Calculus: Early Transcendental Functions</i> ; 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. | |

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| 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.

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| | | 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 | | |

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| 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 one of the questions but please indicate on your homework 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 four full days using this technology, done as a combination class discussion, work with a partner, and homework. These three 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 to 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. |
| 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. Note that iClicker quizzes cannot be made up in any circumstance; these quizzes will usually start at the scheduled class time! |
| 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 DAYS from TIME to TIME; come by Trexler 271 to talk to and meet other students as well as chat with the MCSP faculty members in a casual setting!

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

The Office of Disability Support Services located in the Goode-Pasfield Center for Learning and Teaching in Fintel Library, provides reasonable accommodations to students with identified disabilities. Reasonable accommodations are provided based on the diagnosed disability and the recommendations of the professional evaluator. In order to be considered for disability services, students must identify themselves to the Office of Disability Support Services. Students requesting accommodations are required to provide specific current documentation of their disabilities. Please contact Rick Robers, M.A., Coordinator of Disability Support Services, at 540-375-2247 or e-mail robers@roanoke.edu.

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 Schedule

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| 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 | Derivative Rules Day #1 |
| Fri | Sept 18 | 2.5 | Derivative Rules Day #2 |
| Mon | Sept 21 | 2.6, 2.7 | Derivative Rules Day #3 |
| Wed | Sept 23 | | Review |
| Fri | Sept 25 | | Test 1 |
| Mon | Sept 28 | 2.8 | Implicit Differentiation |
| Wed | Sept 30 | 2.10 | The Mean Value Theorem |
| Fri | Oct 2 | 3.1 | Linear Approximation, Newton's Method |
| Mon | Oct 5 | 3.2 | L'Hôpital's Rule, Indeterminate Forms |
| Wed | Oct 7 | 3.3, 3.4 | Increasing and Decreasing Functions; Maximums/Minimums |
| Fri | Oct 9 | | Technology Day #1: Derivatives in Mathematica |
| Mon | Oct 12 | 3.5, 3.6 | Concavity and Curve Sketching |
| Wed | Oct 14 | | Review |
| Fri | Oct 16 | | Test 2 |
| Fall Break! | | | |
| Mon | Oct 26 | 3.7 | Optimization Day #1 |
| Wed | Oct 28 | 3.7 | Optimization Day #2 |
| Fri | Oct 30 | 3.8 | Related Rates Day #1 |
| Mon | Nov 2 | 4.1 | Antiderivatives |
| Wed | Nov 4 | 4.2, 4.3 | Sums and Area |
| Fri | Nov 6 | | Technology Day #2: Numerical Integration, Detailed Sums |
| Mon | Nov 9 | 4.4 | The Definite Integral |
| Wed | Nov 11 | | Review |
| Fri | Nov 13 | | Test 3 |
| Mon | Nov 16 | 4.5 | The Fundamental Theorem of Calculus |
| Wed | Nov 18 | 4.6 | Integration by Substitution |
| Fri | Nov 20 | 5.1 | Area Between Curves |
| Mon | Nov 23 | 5.2 | Volume (Disks/Washers) |
| Thanksgiving Break | | | |
| Mon | Nov 30 | 5.4 | Arc Length and Surface Area |
| Wed | Dec 2 | | Technology Day #3: Integrals and Working with Them |
| Fri | Dec 4 | 6.2 | Integration by Parts |
| Thanksgiving Break | | | |
| Mon | Dec 7 | 6.6 | Improper Integrals |
| Wed | Dec 9 | | Review |
| Fri | Dec 11 | | Test 4 |
| Tues | Dec 15 | | Final Exam: 8:30 AM - 11:30 AM |