# MATH122B, Fall 2015: Calculus II

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| **Instructor** | Maggie Rahmoeller      *Phone:* (540) 375-2505 |
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**Class Meetings**
M/W/F 12-1PM in Lucas 114
Thursdays (Lab) 8:30-10AM in Trexler 372

**Office Hours**
M/W/F 9-10AM
T/H 10-11AM
Or by appointment (just shoot me an email!)

**Course Objectives**
This course provides a continuation of the study of calculus. Topics to be studied include more applications of the definite integral, sequences and series and applications of them, and vectors and functions of several variables.

**Intended Learning Outcomes**
By the end of this course, successful students will be able to:
- apply the theory of differentiation and integration to model and solve real-world problems.
- recognize a differential equation and be able to both solve basic differential equations and discuss what a differential equation tells you about the process it models.
- determine the behavior of infinite series and understand the role of power series and Taylor series in modern mathematics.
- utilize vectors in two-dimensional and higher-dimensional coordinate systems to model graphs and equations, and apply methods of Calculus to these graphs and equations.
- 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*, by Smith and Minton, 4th Edition
Calculator: A calculator with graphing capabilities
Lab Technology: Laptop with Mathematica installed
Mathematica Free Download: see https://webapps.roanoke.edu/www/it/mathematica/
Prerequisite: MATH 121 (Calculus I) or the equivalent

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

**Course Grades**
The following table lists the weights for the various forms of assessment for this class.

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| Participation and Quizzes | 10% | Tests | 40% |
| Labs | 15% | Final Exam | 20% |
| Homework | 15% | | |

A grade scale will be determined after final grades are computed, but will be no worse than the scale given below:

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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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| Reading | 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! This does not mean you need to understand everything, but rather you should be familiar with the definitions and concepts from the sections. We will use online quizzes, which can be found on Inquire, that will consist of about 4 multiple-choice questions. You will have 5 minutes for each quiz and they should be completed by 10AM on the day of class. You should read the section and take notes as there is not enough time to search the section for the correct answer; however, you may access both notes and your textbook when taking the quiz. |
| Homework | Homework will be assigned regularly in this class (virtually every class period) and may take several forms. Typically, it will be due at the start of the class period immediately following the assigning of the homework. Two problems will be graded for correctness (for 4 points total), and the remainder will be graded for completion (for 6 additional points). Note that some of the problems will serve as good examples to use in class and also to reinforce certain topics. |
| Quizzes | There may 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, including lab days. |
| Labs | The mathematics we will be learning has a large number of applications which we will explore during weekly technology labs. Many of our labs will be done using the Mathematica computer algebra system and will last 1.5 hours and typically require a problem set or lab write-up. You can get a free license and download Mathematica from the website https://webapps.roanoke.edu/www/it/mathematica/ anytime (follow the instructions for "Student personally owned machines" on that webpage). Attendance is required, and if you attend every lab, I will drop your lowest lab grade. You are also required to work in groups of 2 or 3 for every lab. Labs are due each Friday by 5PM. |
| Tests | Four tests will be given according to the schedule on page 4 of the syllabus. 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. Note that weather and other changes in the course schedule may affect the material covered on tests, but unless a test day is canceled due to weather, the tests will happen as scheduled. |
| Final Exam | The final exam will be comprehensive and given during the scheduled time for the final exam for Block 3, i.e. Tuesday, Dec 15 from 8:30-11:30AM. The best way to review for the final is to review your performance on the four tests; focus on material that you did not master the first time around, and review the topics that you did master. |
| MCSP Conversation Series | The Department of Mathematics, Computer Science and Physics 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. 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, 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. 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. |

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| **Attendance &<br>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. Unexcused absences may result in the lowering of the final grade (for example, a B to a B-). 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.** |
| **Disability<br>Support Services** | 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.<br><br>If you are on record with the College's Office of Disability Support Services as having academic or physical needs requiring accommodations, please schedule an appointment with Mr. Robers as soon as possible. You need to discuss your accommodations with him before they can be implemented. Also, please note that arrangements for extended time on exams, testing, and quizzes in a distraction-reduced environment must be made at least 48 hours before every exam. |
| **Academic<br>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 calculators can be taken out during any class or testing period (this includes cell phones; please 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. |
| **Subject Tutoring** | Subject Tutoring is a CRLA Nationally Certified Program located on the lower level of Fintel Library in room 005. Subject Tutoring offers individual appointments in 30-minute intervals for Lab Sciences, Modern Languages, Math and CPSC, Social Sciences, Business and Economics. Hours are Sunday - Thursday 4 p.m. - 9 p.m. For a list of tutorials or to make an appointment, go to www.roanoke.edu/tutoring. |
| **Writing Center** | Roanoke College's Writing Center is located on the Lower Level of Fintel Library and offers writing tutorials focused on written and oral communication for students working on writing assignments/projects in any field. Writers at all levels of competence may visit the Writing Center at any point in their process, from brainstorming to drafting to editing, to talk with trained peer tutors in informal, one-on-one sessions. The Writing Center is open Sunday through Thursday from 4 to 9 pm. Simply stop in, or schedule an appointment by going to www.roanoke.edu/writingcenter, where our schedule of writing workshops and creative writing playshops is also posted. Questions? Email writingcenter@roanoke.edu or call 375-4949. Like our Facebook page for updates! |

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**Course Schedule**

| Day | Date | Section | Topic |
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| Wed | Sept 2 | 5.1 & 5.2 | Area Between Curves & Volumes |
| Thurs | Sept 3 | | **Lab** |
| Fri | Sept 4 | 5.1 & 5.2 | Review Worksheet; **No In-Class Meeting** |
| Mon | Sept 7 | 5.5 | Projectile Motion |
| Wed | Sept 9 | 5.7 | Probability |
| Thurs | Sept 10 | | **Lab** |
| Fri | Sept 11 | 7.1 | Modeling with Differential Equations |
| Mon | Sept 14 | 7.2 | Separable Differential Equations |
| Wed | Sept 16 | 8.1 | Sequences of Real Numbers |
| Thurs | Sept 17 | | **Lab** |
| Fri | Sept 18 | 8.2 | Infinite Series |
| Mon | Sept 21 | 8.3 | The Integral Test and Comparison Tests |
| Wed | Sept 23 | | **Review** |
| Thurs | Sept 24 | | **Test 1** |
| Fri | Sept 25 | 8.3 | The Integral Test and Comparison Tests |
| Mon | Sep 28 | 8.4 | Alternating Series |
| Wed | Sep 30 | 8.5 | Absolute Convergence and the Ratio Test |
| Thurs | Oct 1 | | **Lab** |
| Fri | Oct 2 | 8.5 | Absolute Convergence and the Ratio Test |
| Mon | Oct 5 | 8.6 | Power Series |
| Wed | Oct 7 | 8.6 | Power Series |
| Thurs | Oct 8 | | **Lab** |
| Fri | Oct 9 | 8.7 | Taylor Series |
| Mon | Oct 12 | 8.7 & 8.8 | Taylor Series and Applications |
| Wed | Oct 14 | | **Review** |
| Thurs | Oct 15 | | **Test 2** |
| Fri | Oct 16 | 10.1 | Vectors in the Plane |
| | | | **Fall Break** |
| Mon | Oct 26 | 10.2 | Vectors in Space |
| Wed | Oct 28 | 10.3 | The Dot Product |
| Thurs | Oct 29 | | **Lab** |
| Fri | Oct 30 | 10.4 | The Cross Product |
| Mon | Nov 2 | 10.5 | Lines and Planes in Space |
| Wed | Nov 4 | 10.6 | Surfaces in Space |
| Thurs | Nov 5 | | **Lab** |
| Fri | Nov 6 | 11.1 | Vector-Valued Functions |
| Mon | Nov 9 | 11.2 | The Calculus of Vector-Valued Functions |
| Wed | Nov 11 | | **Review** |
| Thurs | Nov 12 | | **Test 3** |
| Fri | Nov 13 | 11.3 | Motion in Space |
| Mon | Nov 16 | 11.4 | Curvature |
| Wed | Nov 18 | 12.1 | Functions of Several Variables |
| Thurs | Nov 19 | | **Lab** |
| Fri | Nov 20 | 12.2 | Limits and Continuity |
| Mon | Nov 23 | 12.3 | Partial Derivatives |
| | | | **Thanksgiving Break** |
| Mon | Nov 30 | 12.3 | Partial Derivatives |
| Wed | Dec 2 | 12.4 | Tangent Planes and Linear Approximations |
| Thurs | Dec 3 | | **Lab** |
| Fri | Dec 4 | 12.6 | The Gradient and Directional Derivatives |
| Mon | Dec 7 | 12.7 | Extrema of Functions of Several Variables |
| Wed | Dec 9 | | **Review** |
| Thurs | Dec 10 | | **Test 4** |
| Fri | Dec 11 | | Review for Final Exam |
| **Tues** | **Dec 15** | | **Final Exam: 8:30 AM - 11:30 AM** |