Davidson College
Calculus III – Math 160

Course Information

Welcome to Calculus III (Math 160)! This is a 15-week class that meets TR from 8:15-9:30 or 9:40-10:55 in Chambers 2234. The prerequisites for this course are Math 113, a 4 or 5 on the AP Calculus BC exam or permission of the instructor. Please see me if you have any questions about whether this is the right class for you. I’m often in my office (Chambers 3031) and you’re welcome to drop in without an appointment.

Instructor Information

Instructor: Carl Yerger, cayerger@davidson.edu
Office: Chambers 3031, Phone: x2904 (However, email is the best way to contact me!)
Office Hours: To be determined with consultation of the class. One suggestion: Mondays, Wednesdays 2:30-3:30 PM, Tuesdays and Thursdays 1:30-2:30 PM. At other times feel free to make an appointment or stop by!
Department Phone Number: 704-894-2315 (in case of emergency)

Email Policy: To help me identify your messages, please put Math 160 in the subject line. Otherwise I may not recognize your email as a course-related one. In almost all cases, I will respond to your email within 24 hours.

Textbook

We will use the text *Calculus: Early Transcendentals, Tenth Edition*, by Howard Anton, Irl Bivens and Stephen Davis. You should be able to purchase this from the bookstore or from an online bookstore. This book is the standard Calculus textbook at Davidson as two of the authors are faculty in the math department. I may supplement the material in the textbook with other materials and will make copies (possibly electronically via Moodle) of relevant pages when necessary.

General Course Information

Course Description: As described by the course catalogue, this course will be a study of the differential and integral calculus of functions of several variables together with an introduction to vector calculus. Topics include partial derivatives, directional derivatives, gradients, tangent planes to surfaces, double and triple integrals, change of variables in multiple integrals, vector
fields, line integrals, Green’s Theorem, and surface integrals. In particular, we will discuss Chapters 12-15 of our textbook but we will likely not finish all of Chapter 15.

**Why should I take this course?** This course will continue to develop techniques of calculus, which are vital for students in many fields. In this course, aside from theoretical considerations, we will look at applications in physics, economics and engineering. There will be lots of interesting problems that will develop your computational problem solving skills. In addition, you will learn how to write detailed mathematical arguments in a clear manner and learn new ways to attack theoretical problems. The more techniques you know, the easier it will be for you to improvise and develop new ideas in your future work.

**Class Activities:** Instead of the traditional lecture format, I am endeavoring to use a variety of teaching and learning activities to help you succeed. I expect you to have looked at the material we will be discussing in class before we begin class. The advantages of this method are that class time is spent on the topics that require more careful attention, and there is time for more interactive activities. These more active activities have been shown to increase the retention of knowledge, and I hope that this will hold true for you in this course. Please don’t hesitate to visit me if you have questions about these pedagogical techniques.

**Calculator Policy:** At times, we will use calculators and computer animations in this class. The standard calculator will be the TI-89, but I will endeavor to help you regardless of your calculator. Although there can be significant advantages to using a calculator at times, it is also valuable to be able to visualize functions and compute derivatives and integrals by oneself. As a student, I often relied on the calculator more than I should have, and so I want my students to develop a number sense and mathematical thinking skills that do not involve using a calculator. You will be allowed to use a calculator on reviews and tests for numerical computations and to check your work, but you will still need to show all steps of your reasoning. Evaluations will be designed to emphasize original thinking over computational proficiency. As a hint, it may be helpful to review written investigations.

**Learning Outcomes:** By the end of the course, students should be able to:
- Compute partial derivatives, directional derivatives, gradients, arc lengths, tangent planes to surfaces, double and triple integrals in multiple coordinate systems, integrals involving Jacobians, line integrals and surface integrals.
- Model the motion of particles in two and three dimensions via vectors in rectangular and polar coordinates.
- Apply the delta-epsilon proof technique to compute limits in two and three dimensions.
- Apply the definition of differentiability to prove basic related results.
- Write clear, concise homework solutions to computational problems.
- Solve problems related to physical applications including computing centers of mass, constructing equations of motion and determining directions of greatest increase and decrease via the gradient.
Assessments

There will be a number of ways for you to exhibit your learning in this course.

Homework (23%): There will be homeworks assigned throughout the semester to give you practice with the concepts discussed in the readings and in class. In order to aid your learning, each of you will be able to rewrite three homework assignments, and the grade earned on these assignments will be the higher of the original submission and the rewrite. You must have tried the entire homework assignment in order for you to be able to rewrite the homework. Please write homework in a clear manner, it need not be typed. No rewrites will be allowed for late work nor work which doesn’t show at least an attempt at solving every problem. Homework rewrites are due a week after the initially graded homework is returned to you. Homeworks must be turned in at the beginning of class the day they are due or they will be considered late. Selected homework problems of each assignment will be graded. Fifty percent of the homework score will be based on completion and the other fifty percent will be based on correctness.

In-Class Activities/Attendance/Participation (3%): In most classes, you will be given an opportunity to practice the skills learned in class via an in-class activity. After thinking about a problem by yourself or in a small group, I will usually ask someone to present the problem on the document camera. These activities will be collected and returned to you the following class period. In addition, I will post a suggested solution on Moodle for your reference. You will receive full credit if you make a reasonable attempt at completing the activity. If you do not see a score on the worksheet you are to assume that you have received full credit. This is also a way for me to take attendance (and you may be exempted from a particular worksheet if you are absent from class that day, see the Attendance section for more details). Further, your participation in class is expected and encouraged. If you are having problems learning a concept, it is likely that your classmates are also confused. Please do not hesitate to ask questions in class!

Written Investigations (10%): These will be homework problems that will be graded more closely and will be more involved than the usual homework assignments. There may be short writing assignments attached to investigations that will allow you to read a short paper or look for connections with other fields. A rewrite of a written investigation costs you two of your homework rewrites.

Chapter Reviews (12-14% each): There will be three midterm reviews that will be timed (preliminarily three hours), take-home, closed-book and open-calculator. There will be a smaller writ (5-7%) that covers material related to Chapter 15 at the end of the course. You will be given at least a two-day window to complete each review. The review will consist of some routine questions and some involving more ingenuity. When you are finished with each review, please slip them under my door. The clarity and readability of your answers will be factored into your score. You will be able to use a single 8.5 by 11 sheet of notes (with writing on both sides) to help with each review.
Final Exam (20%): The final exam will be cumulative and will be formatted similar to the reviews. The format of the exam will either be self-scheduled or a timed take-home exam after consultation of the class.

Grading: I reserve the right to lower percentages if necessary, but tentatively grades will be based on the following scale:

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<thead>
<tr>
<th>Grade</th>
<th>Percentage</th>
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<tbody>
<tr>
<td>A</td>
<td>90% or above</td>
</tr>
<tr>
<td>B</td>
<td>80% or above</td>
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<tr>
<td>C</td>
<td>70% or above</td>
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<tr>
<td>D</td>
<td>60% or above</td>
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<tr>
<td>F</td>
<td>less than 60%</td>
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I also award + and – grades for students in between these percentage values. Also, my interpretation is that a 90% or above gets at least an A (not an A-), an 80% or above gets at least a B (and not a B-), and so forth. Please don’t hesitate to contact me if you have any questions about where you stand in the class. After every review, I will give approximate grade cutoffs so that you have a better understanding of where you stand in the class.

My goal is to assign points to each assignment so that the total number of points add up to 1000 and points from each assignment are weighted the same (so that losing a point of homework is worth the same as losing a point from an exam, say.)

Students with Disabilities: If you require accommodations in this course, please contact me as soon as possible. In addition, please contact the Assistant Dean of Students for assistance. All discussions will be fully confidential. I want to be able to provide an equitable environment for you to succeed in this course!

Important Dates: Each chapter review will be given approximately once every four weeks. The first one will likely be handed out September 14 and due at the beginning of class September 16. These dates are subject to change given the progress of the class. If you have a conflict that may affect being able to take a review, please contact me before the review is passed out as I am significantly more lenient to students who plan ahead for contingencies (if possible) rather than students who ask for an extension after the fact. You might be able to take the review early or have the window for which you may take the review extended by a day or so in these circumstances.

Organization of Course

Your participation: In order for this class to succeed, your participation in class activities and reading questions is very important. Compared to other lecture-based classes, you will be doing more of the speaking, rebutting, explaining, and so there’s a shared responsibility for your learning in this class. My goal is to break up the 50-minute classes with an in-class activity or two midway during the class. Most classes will be a combination of a lecture coupled with an activity that complements the lecture and your (light) reading of the text prior to class. Just as I
must prepare each lecture, in order for the other activities to work you should be prepared to participate in class discussions and activities.

**A Final Note:** Although you have a responsibility for your own learning, I’m here to help you. Please don’t hesitate to contact me if you are having trouble with an assignment.

**Course Policies**

**Attendance:** In order for you to maximize your learning in this course, it is very important that you make every effort to attend class. If you have a sporting event or other official obligation, let me know in advance if at all possible. Also, please let me know if you are ill. Please arrive to class on time, as your late arrival may be distracting to other students. Let me know if you have schedule conflicts that will force you to be late or need to leave early, so I can help make accommodations for this. Additionally, it is disrespectful to your classmates to read or work on other classes’ work during class as it may be disrupting their learning environment. It is Davidson College policy that students missing more than 25% of classes may receive a grade of F.

**Smart Phones:** This should go without saying, but it is not appropriate to have your phone out during class. This is disrespectful to your fellow students and your professor who want you to learn the material as effectively as possible. If at all possible, please use something other than your phone for calculations as your device may be a distraction to yourself and others. If your phone becomes a frequent distraction to the class, I reserve the right to deduct points from your class participation grade. It is not appropriate to send a text message or use your phone at all during class and I may point your phone usage out to your classmates if I see it during class.

**Late Work:** Any late work (including take home reviews) will be deducted 20% for each business day late. Further, there will be no rewrites allowed on work turned in late. In the real world, if you miss a deadline for a conference or for grant money, the consequences might be much more severe. If you are a student who receives extra time for examinations, this does not implicitly afford you the right for extra time on assignments. You must contact me before the assignment is due if there is a special circumstance, or else your work will also be considered late.

**Exams and Reviews:** If you need an extension on the deadline for a review or exam, you must email me before it is distributed to the class. I will not accept excuses after I pass out the exams except for extreme emergencies (such as a car accident).

**Participation in class:** In order for class activities and discussions to be successful, everyone’s participation is important. Participating in class will help the concepts of the course stick and will be helpful for your learning.
Email: Just as I’m responsible for responding to your questions via email, it is your responsibility to check your email daily for course-related announcements. I will send a test message the second week of classes; please let me know if you don’t receive such a message.

Honor Code: The Davidson College Honor Code applies in all matters of conduct concerning this course.

Collaboration: You are strongly encouraged to collaborate with other students for all the homework problems, but you should write out the final version on your own. Writing out your final answers on your own will help you internalize what you learned from discussing the homework problems and allow you to self-diagnose gaps in your own knowledge. In addition, please acknowledge your collaborators by writing the names of your collaborators on your assignment. Also, if you use books or resources other than the textbook, be sure to cite them. There will be no collaboration permitted on any exams. Please don’t hesitate to contact me if you would like further clarification on this policy.

Extra Help

If you are having trouble with the topics in the course, please don’t hesitate to visit me during office hours, make an appointment or just stop by! The Math and Science Center is also another source of extra help. Located in the Center for Teaching & Learning (CTL) on the first floor of the College Library, drop-in hours are Sunday through Thursday, 8-11 PM, and Sunday, Tuesday, Thursday, 4-6 PM, beginning Sunday, August 28. Appointments are available at other times. For more information, visit http://www.davidson.edu/offices/ctl/students/math-science-and-economics-center, or contact Dr. Mark Barsoum (mabarsoum or ext. 2796). Appointments are available at other times. Additionally, feel free to email me at any time if you have a question, I’ll do my best to answer your questions or set up an appointment with you so we can talk face to face. I want you to succeed in this course!

Disclaimer: The policies and procedures are subject to change depending upon the progress of the class. Changes will be announced in class and rationale behind the changes will be given and discussed.