

Math 152H, Fall 2008
Calculus and Analytical Geometry II

- Instructor:** John Zweck
Office: MP 424
Email: zweck@umbc.edu
Webpage: www.math.umbc.edu/~zweck I will maintain a web page for the course, linked from my web page. I will also communicate with you using a class email list. We will **not** use Blackboard or MathZone in this class.
- Phone:** (410) 455 2424
Fax: (410) 455 1066
Lectures: MW 1:00-2:15pm (MP 105)
Tutorials: MW 3:00pm- 3:50pm (ITE 237). **Attendance and participation in tutorials is required and will count towards your final grade. All midterm exams and quizzes will be held during the tutorial.**
- Text:** “Calculus (Early Transcendental Functions)”, Third Edition, by R.T. Smith and R.B. Minton, McGraw Hill, 2007, Chapters 4.1-4.8, 5.1-5.4, 5.7, 6.1-6.6, 8.1-8.9, 9.1-9.5.
- Prerequisite:** Permission of Instructor or Honors College
Office Hours: M 10-11, W 11-12 *and by appointment*. If you cannot come to my office hours *please* contact me in class or by email/phone to set up a time to meet. Also, you can ask me questions by email/phone.
- Calculators:** No calculators will be allowed on exams. Although you won’t need to, you can use a scientific calculator for homework.
- Tutoring:** For additional tutoring help the Learning Resource Center operates the Mathlab (x 5-2444 for more details). Also, a list of private tutors will be posted in the Math Dept.

Teaching Assistant

- TA:** Shiming Yang, shiming1@umbc.edu
Office: SS 401
Phone: 410-455-3951
Office Hours: Mon 12-1 or by appointment

Course Summary and Learning Goals

The material in Calculus I relies on the concept of the derivative of a function which is defined in terms of a limit of slopes. Similarly, the unifying concept in Calculus II is the concept of an infinite sum, which is defined as the limit of a finite sum as the number of summands approaches infinity. Infinite sums come in two flavours: (1) *continuous*, in the form of definite integrals used to calculate areas, volumes, and averages of continuous quantities, and (2) *discrete*, in which a function is typically represented as an infinite sum of power functions.

The course has four main themes: (1) (a) The definition of the area under a function as an infinite sum in the form of a definite integral and (b) the Fundamental Theorem of Calculus (FTC), which states that integration and differentiation undo each other; (2) Applications of the FTC to the computation of areas and volumes, and of averages in probability; (3) Methods for calculation of indefinite integrals required to apply the FTC to more complicated functions, with special emphasis on the methods of substitution, integration by parts, and numerical integration; and (4) Infinite sequences, series, the representation of functions by an infinite series of power functions, and local approximations of functions by polynomials.

Homework and exams will emphasize calculations for specific examples based on the theory and examples discussed in class. Exams will also test your understanding of the concepts, definitions, theorems, and possibly a few of the proofs covered in class.

Students wishing to master the course material will be guided by the following **learning goals**. Student will:

1. Master the definitions, theorems, canonical examples, and methods of calculation discussed in class and covered on homework. In addition, students will be expected to understand the proofs of a limited number of theorems in the course.
2. Organize their understanding of the course material using the unifying concept of an infinite sum and the four themes discussed above.
3. Gain a conceptual understanding of the FTC and how to apply it.
4. Develop the geometric intuition required to set up integrals to compute arclengths, areas and volumes, a skill that will be further developed in Math 251.
5. Become proficient at the analytical calculation of indefinite integrals.
6. Gain an understanding of when it is appropriate to compute definite integrals numerically, and how to do so.
7. Gain conceptual and practical understanding of infinite sequences and series of real numbers and functions with emphasis on the convergence properties of power series and the local approximation of functions by polynomials.
8. Gain practical experience and understanding of the convergence properties of numerical integration and polynomial approximation schemes by doing group projects.
9. Develop logical and critical thinking skills in a technical context.
10. Gain an appreciation for the importance of theory in mathematics.

Academic Misconduct

I will not tolerate cheating in any form. All instances of cheating I discover will be reported to UMBC's academic integrity committee. (See <http://www.umbc.edu/integrity/>) In particular, in this course, giving or receiving aid on exams will result in a grade of zero for that exam. Copying of homework solutions from other students in the class, from students who have previously taken this or an equivalent course, from a solutions manual, or from the web will be treated as a serious offense. At a minimum this will result in a grade of zero for that homework (which will not be counted as one of the two lowest homeworks I drop when calculating your overall homework grade). For flagrant cheating on homework I reserve the right to give a grade of zero for the homework on which the student was found to have cheated as well as on all homeworks that were turned in prior to the discovery of the offense. Also see comments below in the subsection on Homework.

Here is a summary of UMBC's official policy on academic misconduct, which I fully endorse:

By enrolling in this course, each student assumes the responsibilities of an active participant in UMBC's scholarly community in which everyone's academic work and behavior are held to the highest standards of honesty. Cheating, fabrication, plagiarism, and helping others to commit these acts are all forms of academic dishonesty, and they are wrong. Academic misconduct could result in disciplinary action that may include, but is not limited to, suspension or dismissal. To read the full Student Academic Conduct Policy, consult the *UMBC Student Handbook*, the *Faculty Handbook*, or the UMBC Policies section of the *UMBC Directory*.

Grading

Grades: Homework 10%, Quizzes 5%, Discussion Session Participation 5%, Projects 10%, Three Midterm Exams 15% each, Final 25%

Homework: There will be required and recommended homework problems posted on the course web page for each day of class. *Required problems* assigned on MW will be due at the *start* of class the following **Wednesday**. At least some of them will be graded. Make sure your homework paper is *stapled*. *Recommended problems* will not be graded. However, since the only way to learn math is to do it, you are expected to do the recommended problems, and **some of them will appear on the exams!** *No late homework will be accepted!* Your lowest two homework grades will be dropped. You may ask me questions about the homework and you may collaborate with another student in the class. In fact you are encouraged to do so! However the final write up is your own – *two identical homework papers will both be given zero.*

Quizzes: Each quiz will be 20 minutes in duration and consist of two questions. The quizzes will be held during the tutorial sessions. The primary purpose of the quizzes is to prepare students for the first two midterm exams.

- Quiz 1: Mon, Sept. 22nd

- Quiz 2: Mon, Oct 20th

Projects: There will be three projects to be done in groups of two. The projects will require students to use the mathematical software MATLAB. *Students are strongly encouraged to attend the tutorial on Basic Matlab on Sept. 3rd from 1-2pm in ENGR 122 run by the Center for Interdisciplinary Research and Consulting (CIRC).* More details on the project and advice for how to write them will be provided in due course.

- Project 1: Assigned Mon Sept 15th, Due Mon Oct 6th.
- Project 2: Assigned Mon Oct 13th, Due Mon Nov 3rd.
- Project 3: Assigned Wed Nov 12th, Due Wed Dec 3rd.

Midterm Exams: There will be three 50 minute midterm exams **held during the tutorial sessions.**

- Midterm 1: Mon Sept 29th
- Midterm 2: Mon Oct 27th
- Midterm 3: Mon Nov 24th

Final Exam: **Wed Dec 17th, 1:00-3:00pm in MP 105.** The final will be based on the whole course. Some questions may be more difficult than those on the midterms.

How I assign final grades

For each exam I work out how many points I expect a student who has a solid understanding of the material to get. I tend to put the bottom B near this score. Then I work out where to place the bottom A,C,D using the grade distribution and by looking at individual exams. I also work out the bottom A,B,C,D for the homework, quizzes and projects. Then I take an imaginary student who got the bottom B (say) for each component of the course and calculate their score. If your score is higher than the imaginary student's you get a B. If it is a little less than the imaginary student's score I look carefully at your work to decide whether you deserve a B or a C. Most importantly I look at your final exam. Typically one or two students do much better on the final exam than on the other components of the course. If a student has a mid C grade going into the final but writes a mid to high B final I will probably give them a B for the course. *Also students who do very poorly on the final might find that their course grade is lower than they had expected!* In short I reward strong finishers who can show me they have a solid understanding of the entire course.

Advice for Homework

1. If you get stuck on a problem get help and get it before you waste too much time!! Here are some places you can go for help.
 - Carefully read the book (again!).

- Ask me or the TA for help by email or in person.
 - Ask a fellow class member – often two heads are better than one! **I encourage you to find a study partner for this class.** First attempt the hwk yourself, then discuss it with your study partner, and finally carefully write the solutions up in your own words.
 - Sleep on it. Some of my best ideas come when I wake up in the morning.
2. My Dad used to say “You can’t do maths on a postage stamp”, so use lots of paper. Write your solutions up neatly *after* working out the problem on scrap paper. Apart from anything else, this helps you organize your thoughts and therefore learn the material better.
 3. I’ll teach you by example how to write up your solutions in a connected step-by-step fashion with explanatory sentences. You should aim to write up solutions so that you’ll easily understand them in a month’s time when you’re studying for the exam!
 4. Some of the homework problems will be harder than others. Don’t expect to solve them all on the first try!
 5. Never start your homework the day before it is due!!
 6. You should spend *at least* 10-12 hours a week on this course outside of class time.
 7. **If your homework grades are not as high as you’d like you should arrange to meet with me for 15 minutes at a fixed time each week. We will use this time to discuss what you did wrong on past homeworks and also check how you are doing on the current homework. Don’t wait until exam time!**

Advice for Exams

Types of Questions: The exams will test whether you have mastered the basic concepts and methods of calculation as well as whether you can apply your knowledge to solve problems. *You will not get any credit for an answer unless you also show how you arrived at that answer.* Some questions will be similar or even *identical* to homework and review questions. Others will look a little different from those you have seen before and will test whether you really understand the *concepts* we have discussed in class. At least one question on each exam will involve *written explanations* of the *theory* we discuss in class. For example, I may ask you to explain some of the more important fundamental concepts, to carefully state some of the most important theorems, and to do *short* proofs of such results. *As we go through the material in class I will tell you which parts of the theory I may examine in this way.*

Review for exams: I will suggest practice problems before each exam. A review session will be held before each exam.

Making up an exam you missed: If you miss one of the 3 midterms you *may* be given the chance to take a make up exam. To request a make up you should speak with me **no later than 48 hours after** the exam time. Generally speaking, you will be offered a make up if you are sick or if a close relative or friend is gravely injured/sick or dies. However I

will listen to all reasonable requests. Be prepared to bring appropriate evidence in support of your request. There will be no make ups for the final exam.

How to succeed in the course

This is a very fast paced course and new material is always built on older material. In my opinion to succeed in the class you *must* do the following.

1. Attend class every day. A study in the Math Dept at the University of Texas has shown that for every class a student misses their grade falls by about 10%.
2. *Turn up to class on time!*
3. If you do miss class contact me *asap* to find out how to catch up.
4. Begin each hwk assignment *the same day* that we cover the material in class. If you do this you will understand the next lecture much better!
5. Read each section of the book the day *before* we cover it in class.
6. I encourage you to *ask questions* both in and out of class. If you are dazed and confused most likely most of your class mates are too! So you'll be doing everyone a favor by asking your question.
7. In class I call on people by name to answer questions. This is to keep you involved and helps me find out whether you understand what's going on. **If you do not feel comfortable being called on in class, please come and talk with me, and we will find another way to actively involve you.**
8. Come and talk with me in my office.
9. Make the best use you can of the tutorial sessions.
10. Ask questions of the TA in tutorial sessions and in his/her office hours.
11. Learn the art of taking good notes.
12. Do *all* the hwk problems. Work out what your mistakes are on the graded hwk and learn from them.
13. Talk math with your fellow students, don't work in isolation.