

21-120 : Differential and Integral Calculus

Summer I 2011

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Office: Wean 6211
Office Hours: Noon-1pm or by appointment
Course Dates: May 16-June 24, 2010
Lecture Times: Weekdays 10:30-11:50
Lecture Place: Wean 4709
Textbook: *Essential Calculus: Early Transcendentals* by Stewart

Introduction: This course is designed to be a first course in differential and integral calculus. Calculus is a branch of mathematics where the primary questions has to do with *rates of change*. It has applications in all areas of applied science and engineering. An understanding of calculus is essential for success in any of these fields.

Prerequisites: A good grasp of algebra and trigonometry is required before this course. Algebra is the “language” of calculus. Another important prerequisite is having sufficient geometric intuition, ie. being able to picture geometric objects and the graphs of functions on the plane.

Course Objectives: By the end of the course, you should be capable of the following:

- Being an expert in basic algebra, especially in understanding what the concept of a function, and know basic laws of exponentials and logarithms and knowing basic trigonometry
- Understanding the definition of a limit, knowing how to take limits, knowing when a limit does not exist, knowing the properties and laws of limits,
- Knowing the limit definition of continuity, determining whether a function is continuous, knowing the intermediate value theorem and it’s applications
- Knowing what a tangent line is, knowing what a secant line is, being able to determine average rates of change using secant lines
- Being able to use the limit definition of derivatives, Being about to determine the derivative of a function using the limit definition of the derivative, Being able to give the equation for the tangent line using the limit definition of the derivative.
- Knowing and using the rules for differentiation (power rule, product rule, quotient rule, chain rule), knowing the derivative of trig functions and exponentials
- Knowing how differentiate implicit functions and take higher derivatives.
- Doing linear approximations using tangent lines, knowing and being able to use the mean value theorem.
- Finding extrema of a function, sketching the graph of a function, knowing how optimize and other applications of differential calculus
- Knowing what an anti-derivative is, knowing techniques for how to take anti-derivatives (parts, trig-substitution, u-substitution, partial fractions)
- Knowing and being able to use the Fundamental Theorem of Calculus, understanding the relationship between integration and differentiation and the area under the curve of a function
- Knowing and being able to find the exact area under the curve of a function, knowing and being able to find the exact area between the curves of two functions.
- Being able to find the volume of a solid of revolution (discs and shells) and over a region of the plane
- Know what a differential equation is, and how to solve very basics ones.

Assignments: There will be homeworks assigned weekly due every Monday. You will be given the assignment one week before it is due. You must show all your work to get full credit. Not all problems may be completely graded for credit. Late homework is never acceptable, but you may hand in your homework early if you plan on missing a Monday class.

Quizzes: There will be frequent announced and unannounced quizzes given class. This will usually only be one easy question on the things taught the previous class. Each quiz will be out of 3 points: 0 for did not take, 1 for completely wrong but did take (an attendance point), 2 for almost right, and 3 for completely right. There will be about three quizzes every week. There will be three quizzes dropped; quizzes cannot be made up if you miss class.

Exams: There will be an 80 minute, closed books/notes, midterm and a final exam. These account for the majority of your grade in this course. The midterm is scheduled for June 8th, which is roughly midway through the semester. The final will be June 24th. Exams will be preceded by a workshop day where you will work in groups to solve some problems.

They will not be *explicitly* comprehensive, but by the nature of the course if you don't have a full understanding on the midterm you will probably not do well on the final exam.

You may take the exam before the scheduled date with my permission. Makeups after the date of the scheduled exam will **only** be given in the case where you can provide documented proof of an emergency or illness.

Grades: Your grade will be based on all the above work, and only that work. There's no possibility for extra credit. You are more than welcomed to discuss with me if you feel any assignment has been mis-graded or you believe you deserve more credit. You have every opportunity to earn an A in this course. Here is roughly how your grade will be calculated:

Homework:	20%	5 total assignments
Quizzes:	20%	≈18 total, lowest 3 dropped
Midterm:	30%	
Final Exam:	30%	

The grades will be assigned on the standard scale:

A	90-100%
B	80-89%
C	70-79%
D	60-69%
R	< 60%

If necessary, these cut offs might be changed at the end of the semester, but only for your benefit.

Course Policies and Advice

- Calculators are *never* to be used on any in-class assignment. You may check your homework with a calculator, but work must be shown. Calculators often slow work and are a crutch for understanding topics and procedures.
- Attendance is strongly encouraged, especially considering 20% of your grade will be determined by quizzes, which will be largely unannounced.
- If you do not understand something in class, please ask. Odds are, if you do not understand something then others in the class do not. If you are not willing to speak up during class, you should ask me during my office hours.
- Do not wait till the last minute for anything. The homework will take time. Exams will creep up on you. Time is not a luxury we have in a summer class.
- My office hours are for your benefit. Please come to them if you have any concerns or need any help with the course. You can also come if you just want to say hi.
- **Academic Honesty:** All work handed in by you, whether in class or homework, must be the work of yourself and no one else. This will be strictly enforced. The penalty for any violation will be at least a 0 on that assignment.
- **Special Needs:** If you have documentation supporting the needs for special accommodations (extra time on tests, special seating, etc) then you must present it to me promptly. The day of the test is not prompt. I will assist with any reasonable requests.

- I reserve the right to make any changes to this syllabus during the course of the semester

Important Dates:

May 16: Class Begin
May 20: Drop Deadline
May 30: Memorial Day; No Classes
June 8: Midterm Exam
June 23: Last Day of Class. Withdrawal Deadline
June 24: Final Exam

Course Calendar: This is subject to change if necessary

May						
Sun	Mon	Tue	Wed	Thu	Fri	Sat
1	2	3	4	5	6	7
8	9	10	11	12	13	14
15	16 §1.1-2 Functions	17 §1.3-4 Limits	18 §1.5-6 Continuity	19 §2.1-2 Tangents and Deriva- tives	20 §2.3-4 Derivative Rules	21
22	23 §2.4-5 Chain Rule	24 §2.6-7 Implicit Dif- ferentiation	25 §2.8-3.1 Linear Approxima- tions	26 §3.2-3 Logs, Ex- ponentials, and Inverses	27 §3.4-5 Exponential Decay and Inverse Trig	28
29	30 Memorial Day	31 §3.7 L'Hôpital's Rule				

June						
Sun	Mon	Tue	Wed	Thu	Fri	Sat
			1 §4.1-2 Extrema and MVT	2 §4.3-4 Graph Shapes and Sketching	3 §4.4-5 Sketching + Optimiza- tion	4
5	6 §4.7,5.1 Anti- derivatives	7 Workshop Day	8 Midterm	9 §5.2-3 Definite In- tegrals	10 §5.4 Fundamental Thm of Cal- culus	11
12	13 §5.5 u- substitution	14 §6.1 Parts	15 §6.3 Partial Frac- tions	16 §6.2 Trig- substitution	17 §6.6 Integration + Improper Integrals	18
19	20 §7.1 Area Be- tween Curves	21 §7.2-3 Volume	22 §7.3 Volumes of Solids of Revolution	23 Workshop Day	24 Final Exam	25
26	27	28	29	30		