MATH 1310-004: Engineering Calculus I Spring 2017
Course Syllabus

Instructor: Ziwen Zhu
Office: JWB 327
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Lectures: M,T,W,F 10:45am-11:35pm, ST 205

Office Hours (Tentative): M 2:00pm-3:00pm, W 2:00pm-3:00pm, or after Tuesday's class

Course Web Page: http://www.math.utah.edu/∼zzhu/1310Spring2017.html

Textbook: *Calculus: Concepts and Contexts*, 4th Edition, by James Stewart, ISBN: 13-978-0495557425.

Important Dates (Please schedule accordingly):

- **Midterm 1:** Friday, Feb. 17th (in class)
- **Midterm 2:** Friday, March. 31st (in class)
- **Final Exam:** Thursday, April 27th, 10:30 am - 12:30 pm

Course Information: Math 1310, Engineering Calculus I is a 4-credit course.

Lab Information: In the lab, students participate in teaching-assistant-facilitated problem solving sessions. These sessions are specifically designed to aid the problem solving fluency learning objective, as well as basic skills practice. Attendance to the lab section is required, and will be taken into account when computing the lab part of a students total grade.

Prerequisites: C or better in College Algebra and Trigonometry (MATH 1050 and MATH 1060), or
C or better in Precalculus (MATH 1080), or
AP Calc or AB score of 3 or better, or
Accuplacer CLM score of 95 or better, or
ACT Math score of 28 or better, or
SAT Math score of 630 or better, or
Department Consent

Course Description: Differential and integral calculus with a focus on engineering applications and projects: functions and models; rates of change in science and engineering, limits and derivatives; related rates; derivatives and shapes of graphs; optimization; Newton's method; definite integrals, anti-differentiation and Fundamental Theorem of Calculus; techniques of integration; numerical and symbolic integration with software; arclength, area and volumes via integration.

Expected Learning Outcomes: The goal of Math 1310 is to master the basic tools for the study of functions $f(x) = y$, termed the calculus, and become skilled in its use for solving problems in science and engineering. These basic tools and problem solving skills are described below.

The tools and skills

1. Students will understand how to transform functions into other functions through x- and y- translations and rescaling, re-parameterizations, and function composition. Students will also know the properties of special classes of functions including logarithms, exponential functions, polynomials, and rational functions; and know how to obtain function inverses $f^{-1}(y) = x$ when they exist.

2. Students will master the concept of a limiting value of a function $f(x) = y$ when x approaches a value c, know when limits exists, utilize limit laws, how the property of continuity of a function at c relates to its limiting value, how asymptotic behavior can be described by limits, and how limiting values can be specified even when the $f(c)$ is not defined.

3. Students will understand how to use limits to compute the derivative of a function f' that describe or rate of change of a function f. Students will be able to utilize derivatives to model how two related quantities change with respect to each other, including motion of objects by in terms of velocity and acceleration. Students will also learn the methods of differentiation for different classes of functions including exponential and logarithmic functions, trigonometric and inverse trigonometric functions, power functions, and compositions, sums, products, and quotients of functions, as well as differentiating functions that are only implicitly defined by an equation. Students will also be able to utilize the derivative in applied contexts, including function approximation, and how the average slope of a function relates to the derivative through the mean value theorem. If two quantities are related by an equation, students will be able to obtain the derivative of one quantity by knowing the derivative of the other. Students will know how to utilize linear approximations to perform numerical/algorithmic equation solving via Newton's method. Also, students will be able to utilize the derivative to find maximum, minimum, or otherwise "optimal" input values for equations important in science, business, and engineering.

4. Students will understand the definition of the integral of a function as the limiting value of an increasingly large average of function values. They will be able to relate the integral to anti-differentiation, when appropriate, through the fundamental theorem of calculus. Students will also be able to relate the integral to the area under the function's curve, know how to approximate the integral by a finite sum, and how to integrate over infinite-length domains. Specific integration techniques will also be mastered, including substitution, integration-by-parts, and partial fractions. Finally, students will understand the key concept underlying integration, that it computes the net accumulation of a quantity through summation of the change in the quantity amount per unit of time or space, over an specified interval of time or space.

Problem solving fluency

1. Students will be able to read and understand problem descriptions, then be able to formulate equations modeling the problem usually by applying geometric or physical principles. Solving a problem often requires a series of transformations that include utilizing the methods of calculus. Students will be able to select the appropriate calculus operations to apply to a given problem, execute them accurately, and interpret the results using numerical and graphical computational aids.

2. Students will gain experience with problem solving in groups. Students should be able to effectively transform problem objectives into appropriate problem solving methods through collaborative discussion. Students will also learn how to articulate questions effectively with both the instructor and TA, and be able to effectively articulate how problem solutions meet the problem objectives.

Tutoring Lab: T. Benny Rushing Mathematics Student Center (adjacent to JWB and LCB), Rm 155
M - Th 8 am - 8 pm
F 8 am - 6 pm
(closed Saturdays, Sundays and holidays)
They are also offering group tutoring sessions.
If you're interested, inquire at the Tutoring Lab. `http://www.math.utah.edu/ugrad/tutoring.html`

Private Tutoring: University Tutoring Services, 330 SSB (they offer inexpensive tutoring). There is also a list of tutors at the Math Department office in JWB233.

Computer Lab: Also in the T. Benny Rushing Mathematics Student Center, Room 155C.
M - Th 8 am - 8 pm
F 8 am - 6 pm
Link to computer lab is `http://www.math.utah.edu/ugrad/lab.html`

Grading: The grades will be calculated as follows:

Weekly Homework	10%
Quizzes	15%
Lab	15%
Midterm 1	15%
Midterm 2	15%
Final Exam	30%
Total	100%

The lab score consists of lab attendance (5%) and lab sheet grade (10%).

Each part of your grades will be posted on Canvas. I will do my best to update the grades in time and keep everything accurate. However, I would encourage you to check your own grades on a regular basis so that you can contact me immediately if there are questions or mistakes about your grades.

Homework:

- I will collect homework on Friday. All of the homework assigned the previous week is due at that time. I will NOT accept any late homework due to unfairness to the grader. However, lowest homework grade will be dropped for every student.
- Homework is picked from the textbook. The homework is graded only for completeness. If you do every assigned problem, you will get full credits. There are keys to odd-numbered problems in the book. I would recommend that you check yourself for correctedness on those problems. If you have questions, try to utilize all the resources mentioned above such as tutoring center and office hours.
- Your final homework score will be the average of each week's homework score with the lowest one dropped.

Quizzes: : During the course we will have short quizzes on Friday (except the midterm weeks). The first quiz will be in the first week, i.e. Jan. 13th. It will be arithmetic problems. The purpose of the first quiz is to evaluate the arithmetic level of the whole class. If you don't do well in that quiz, you might need extra efforts throughout the semester to pass the course. The other quizzes will usually be about material taught in the corresponding week. You will not be allowed to use a calculator during these quizzes. Your lowest 2 quiz grades will be dropped.

Midterm: There will be 2 midterms. Each midterm will focus on material presented in class since the last midterm. You will not be allowed to use a calculator during the Midterm.

Final Exam: All students are expected to take the comprehensive final exam. You will fail the course automatically if you skip the final. It will occur on Thursday, April 27, 2017 10:30 am C 12:30 pm. Unless in extreme cases, the time is NOT negotiable. It is your responsibility to schedule accordingly so that you can make the final. When there is an absolute emergency, please speak to me as soon as possible so that a fair plan can be worked out. The location is to be announced. The final will cover all topics presented in class and calculators are not allowed.

Grading Scales: The grade scale will be the usual: A (93-100), A- (90-92), B+ (87-89), B (83-86), B- (80-82), C+ (77-79), C (73-76), C- (70-72), D+ (67-69), D (63-66), D- (60-62), E (0-59).

ADA: The University of Utah seeks to provide equal access to its programs, services and activities for people with disabilities. If you will need accommodations in the class, reasonable prior notice needs to be given to the Center for Disability Services (CDS), 162 Olpin Union Building, 581- 5020 (V/TDD). CDS will work with you and me to make arrangements for accommodations. All information in this course can be made available in alternative format with prior notification to CDS.

Student Responsibilities: All students are expected to maintain professional behavior in the classroom setting, according to the Student Code, spelled out in the Student Handbook. You have specific rights in the classroom as de-

tailed in Article III of the Code. The Code also specifies proscribed conduct (Article XI) that involves cheating on tests, collusion, fraud, theft, etc. Students should read the Code carefully and know you are responsible for the content. According to Faculty Rules and Regulations, it is the faculty responsibility to enforce responsible classroom behaviors, beginning with verbal warnings and progressing to dismissal from class and a failing grade. Students have the right to appeal such action to the Student Behavior Committee. `http://regulations.utah.edu/academics/6-400.php`

Other Policies:

- Please silence your technology during the class. Computers or labtops are NOT allowed in class.
- You are allowed to bring a scientific calculator, or a programmable/graphing one. You can use them to do your homework if you want, but since they won't be allowed on midterms or on the final, it might not be a good idea to rely heavily on these technologies.
- You need to have a valid email address registered with Campus Information System. I will send emails to the class and expect you to be responsible for receiving that information.
- there will be no make-ups or retakes of quizzes and exams. Should it happen that you cannot make the test, please communicate with me IN ADVANCE and provide necessary justification of extenuating circumstances. In that case, I can work out a fair solution to the problem.
- If you have questions about any exam/quiz grade, or you want to appeal the grading of the exam/quiz, you must bring it to me within one week of the exam. After that, you will have to live with whatever grade you got.
- If you cheat on any homework, project, quiz or exam, I will automatically give you a zero for that assignment. Depending on the severity of the cheating, I may decide to fail you from the class. In all cases of cheating, I will also report the incident to the Dean of Students. Additionally, if an international student cheats, I will also report the incident to the International Students Office.
- I reserve the right to make any change in course policy mentioned above in the syllabus. If a change is needed, I will announce the change to the class and send a class-wide e-mail.