Accelerated Engineering Calculus I - Math 1311
Fall 2017 - Sect 1 (2/3)

Lectures:	MWF 8:05am-9:25am - ST 208
Labotary:	H 8:35-9:25am - LS 107 - Section 2
	H 7:30am-8:20am - LS 102 - Section 3
Instructor:	Christel Hohenegger
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Webpage:	http://www.math.utah.edu/~choheneg
TA:	Cody Fitzgerald - LCB 315
Course webpage:	CANVAS on CIS (http://cis.utah.edu)
Office Hours:	TBD or by appointment

Textbook: *Calculus: Concepts and Contexts*, by James Stewart, 4th edition; BROOKS/ COLE CENGAGE Learning, 2010; ISBN-13 0-495-55742-0; ISBN-10 0-495-55742-0; price about $195.

Updates: Topics covered and assignments will be posted on CANVAS. You are responsible for checking it periodically.

http://utah.instructure.com/courses/461201

Mathematics Tutoring Center: Free tutorial is available in room 155 of the T. Benny Rushing Mathematics Center (adjacent to the LCB and JWB). Hours are 8am-8pm Monday-Thursday and 8am-6pm on Friday. For more information consult the website.

http://www.math.utah.edu/ugrad/mathcenter.html

You might find the videos and problems from the website of the Khan Academy helpful.

https://www.khanacademy.org/

The math department has videos available online of the regular calculus classes from Intermediate Algebra to Calculus III.

http://www.math.utah.edu/lectures/

College of Engineering Tutoring Lab: Additional office hours held by the TAs for the engineering calculus sequence (MATH 1310, MATH 1311, MATH 1320, MATH 1321, MATH 3140) and MATH 2250 will be scheduled in WEB 1622. Hours are 8am-5pm Monday-Thursday. TAs hours will be posted once the schedule is determined.

Prerequisites: AP Calculus AB score of 4, OR better OR AP Calc BC score of 3 or better, OR Departmental Consent.
Requirement Designation: Quantitative Reasoning (Math & Stat/Logic).
Course Attribute: Honors Course.

Description: The course will cover essential of knowledge of Calculus, a set of tools to analyze the relationships and functions essential for modeling physical processes important in science and engineering applications. The course is structured into four lecture hours per week, and one lab hour per week. The lecture class will incorporate instructor lectures, weekly short quizzes, random pop quizzes, and group work. Lab sections will comprise group problem solving sessions led by the teaching assistant, weekly homework discussion and students participation. Topics covered include review of introductory calculus, applications of differential and integral calculus, introduction to differential equations, conic sections and polar coordinates, numerical approximation, sequences and series, power series. integration (Chapters 1.3-7.4).
The work you will complete in Math 1310 comprises weekly homework and quizzes, two super quizzes, two midterm exams, and a comprehensive final exam. Homework will be turned in and quizzes will be given every Friday except during exam days and holidays.

Learning Outcomes: The goal of Math 1311 is to master the basic tools for the study of functions $f(x) = y$ and become skilled in its use for solving problems in science and engineering. These basic tools and problem solving skills are described below.
Tools and skills:

- 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.
- 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 $f(c)$ is not defined.
- Students will understand how to use limits to compute the derivative of a function $f'(x)$ that describe or rate of change of a function $f(x)$. Students will be able to utilize derivatives to model how two related quantities change with respect to each other, including motion of objects 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.

- 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.
- Students will be able to utilize methods of integration to compute volumes of objects with circular-shaped aspects, and compute lengths of curves. These applications introduce a higher-level concept of integration, involving the summation of small volume segments dV or small length segments ds, which are computed by performing an appropriate parameterization to a real-number-line integral in terms of dx.
- Students will be skilled in using integration to compute problems important in physics and engineering. Students will know how to compute of an average value of a function using the mean value theorem for integrals, the center of mass for objects, and the computation of energy as a force integrated over a distance. Students will also be able to utilize physical laws to formulate differential equations that solve for the motion of masses by forces of gravitation, friction, electrostatics, to name a few. Students will also become familiar with the phenomenon of exponential growth and decay in science and engineering contexts.

Problem solving fluency:

- Students will be able to read and understand problem descriptions, 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.
- 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.

Reading: Students are expected to have read the corresponding section prior to each class. We will cover about three sections per week. Even if students spend as little as ten minutes on this, it will make the discussion in class much clearer.

Attendance to the lab is mandatory and will be recorded. Students should attend all the lectures and attendance will be checked randomly. Quizzes, super quizzes and exams take place in lecture, and homework and lab worksheets are due in class. Students should attend the lab session they are registered for.

Technologies: Students should refrain from using cell phones, tablets and laptops to check emails or social media accounts, to chat with friends, to play games, or to surf the web. Students are welcome to use technologies to take notes.

Lab: Every Thursday, a Teaching Assistant-directed lab section will be held. These lab sections, which have smaller class sizes, consist of working on lab worksheet-reports. The worksheet tend to cover longer, more in-depth problems than those found in homework and exams, and will sometimes require use of Maple or Matlab software to complete. The TA will be there to help guide students through the problems and help with any computer challenges. Completion of worksheet-reports will require work outside of the lab hour. The group work will also help students prepare for the quizzes and exams. Credit will be given for both lab attendance and completed worksheets. Lab worksheets will be turned at the *beginning* of lecture on the following Monday. The lowest two worksheet scores will be dropped. No late worksheet (past the first fifteen minutes of lecture) will be accepted.

Quizzes: At the *beginning* of every Friday class (except when an exam or super quiz is scheduled), a short 1-2 problem quiz will be given, taking roughly 10 minutes. The quiz will cover relevant topics covered in the week's lectures and in lab. The two lowest score will be dropped. No make-up quiz will be given.

Super Quizzes: Two weeks prior to each exam, a more extensive quiz will be given at the *beginning* of class, consisting of 2-3 problems and taking roughly 30 minutes to complete. The super quiz will cover material from the preceding weeks. None of the super quizzes can be dropped. Students should check with the up-to-date CANVAS schedule for the dates of the super quizzes. The tentative dates are **September 15 and October 27**.

Homework: Roughly four textbook sections are due on most Mondays at the *beginning* of your lab section from lectures covering material through the preceding week. The

lowest three homework scores will be dropped. Only hardcopy and stapled assignments will be accepted (no digital copies) and no late homework (past the first fifteen minutes of lecture) will be accepted. A list of problems for each homework assignment will be posted on CANVAS. The grading will be based on completion of all listed problems and correctness of the graded (highlighted) problems. The assignments may be updated dynamically through the semester, so students should check CANVAS regularly.

Midterm exams: There will be two in-class exams. No books, notes, formula sheets, calculators (scientific or not), computers, phones (smart or not) or electronic devices (including smart watches) will be allowed. The tentative dates are: **September 29, November 10**. Students should always consult CANVAS to confirm those dates and the material covered. None of the exams can be dropped. The lowest exam score can be replaced by the score of the final exam (if better).

Final Exam: The final exam covers all the material presented during the semester. It will be held on **Friday, December 15, 2017 8:00am-10:00am** in the classroom.

Review and practice: A list of practice problems will be posted a week prior to the midterms and final exam. Review for the exams will occur both in class and in the lab.

Make-up and regrading: Any conflict leading to missed exams or super quizzes are the student's responsibility and must be arranged ahead of time or within a week past the test. Failure to do so may result in a zero for the corresponding test. Regrading inquiries must be submitted in writing within a week of the test being returned.

Students with Disabilities: The University of Utah seeks to provide equal access to its programs, services and activities for people with disabilities. If students will need accommodations in the class, reasonable prior notice needs to be given to the Center for Disability Services, 162 Olpin Union Building, 581-5020. CDS will work with the student and us to make arrangements for accommodations.

Grading: Grades are determined as a weighted average as follows

Attendance	Worksheets	Quizzes	Super Quizzes	HW	Exams	Final
8%	10%	7%	7%	8%	35%	25%

Letter grades A/B/C/D are determined as follows 100/88/76/64. I reserve the right to modify these in special cases and to decide if a curve is needed.

Honor Code: Students are expected to abide by the University of Utah Honor Code and to avoid any instances of academic misconduct, including but not limited to: (1) possessing, using, or exchanging improperly acquired written or oral information during an exam, (2) substitution of material that is wholly or substantially identical to that created or published by another individual(s), and (3) false claims of performance or work.

Important Dates:

Class begins	August 21
Labor Day holiday	September 4
Super quiz 1	September 15
Exam 1	September 29
Fall break	October 8-15
Super quiz 2	October 27
Exam 2	November 11
Thanksgiving break	November 23-26
Class ends	December 7
Reading day	December 8
Final exam	December 15, 8-10am

We want every student to be successful, not only in this class, but in their entire undergraduate career and we are here to help. Students should not be shy to ask questions during and after lectures, to come by office hours or to email us with any concerns, and to be engaged.

Have a great semester !