Accelerated Engineering Calculus I - Math 1311
Fall 2019 - Sect 4 (5)

Lectures:	MWF 10:45am-11:35am - AEB 320
	T 10:45am-11:35am - AEB 310
Labotary:	H 10:45am-11:35am - JFB-B1
Instructor:	Christel Hohenegger
Office:	LCB 333, (801) 585-1637
E-mail:	choheneg@math.utah.edu
Webpage:	http://www.math.utah.edu/~choheneg
TA:	Daniel McCormick JWB 327, mccormic@utah.edu
Course webpage:	Canvas on CIS (http://cis.utah.edu)
Office Hours:	MW: 9:30am-10:30am 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. Students are responsible for checking it periodically.

http://utah.instructure.com/courses/578274

Mathematics Tutoring Center: The Mathematics Tutoring Center, room 155 of the T. Benny Rushing Mathematics Center (adjacent to the LCB and JWB), offers free, drop-in tutoring to students enrolled in MATH 1311. The tutoring center will open Monday, August 26th, and the hours are:Monday - Thursday 8:00AM - 8:00PM and Friday 8:00AM - 6:00PM. The tutoring center is closed during semester breaks, weekends, and University holidays.(webpage link is below). For more information consult the website.

http://www.math.utah.edu/undergrad/mathcenter.php

The videos and problems from the website of the Khan Academy might be 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/

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.

Course Description: Math 1311 and 1321 together are equivalent to the three semester sequence Math 1210, Math 1220, and Math 2210. This sequence is intended for engineering majors. 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.

Course Overview: The course will cover essential 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, homework discussion and students participation. Topics covered include Chapters 1.3-6.6 and 9.1-9.6.

Learning Method: The work to be completed in Math 1311 comprises weekly homework, lab worksheets and quizzes, two super quizzes, two midterm exams, and a comprehensive final exam. Lab worksheets 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 to 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, know how the property of continuity of a function at c relates to its limiting value, know how asymptotic behavior can be described by limits, and know 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 the 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 phys-

ical 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 sections 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 and exams take place in lecture, and lab worksheets are due in class.

Technologies: Students should refrain from using cell phones, tablets and laptops to check emails or social media, 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. This lab section consists of working on lab worksheets. The worksheet tends to cover longer, more in-depth problems than those found in homework and exams, and will sometimes require use of 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 is scheduled), a short 1-2 problem quiz will be given, taking roughly 10-15 minutes. The quiz will cover relevant topics covered in the week's lectures. The two lowest score will be dropped. No make-up quiz will be given.

Homework: Homework will be collected electronically every Wednesday using Gradescope. The list of problems for each section as well as instructions on how to turn in homework will be posted on Canvas. Students are strongly encouraged to solve the homework problems to gain proficiency in the techniques and to prepare for quizzes and exams. Homework will be periodically discussed in class and during the labs. Not late

homework or paper homework will be accepted. The lowest two homework scores will be dropped.

Midterm exams: There will be two in-class exams. No books, notes, formula sheets, calculators, computers, phones (smart or not) or electronic devices (including smart watches) will be allowed. No formula sheet will be provided or allowed. The tentative dates are: **October 4 and November 22**. Students should always consult Canvas to confirm those dates and the material covered. None of the exams can be dropped.

Final Exam: The final exam covers all the material presented during the semester. It will be held on **Monday, December 9, 2019 10:30am-12:30pm** 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. Students are encouraged to review all the material including homework, quizzes and examples discussed in class, not just the review problems.

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.

The Americans with Disabilities Act: 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, 801-581-5020. CDS will work with the student and us to make arrangements for accommodations. All written information in this course can be made available in an alternative format with prior notification to the Center for Disability Services.

Grading: Grades are determined as a weighted average as follows

Attendance	Worksheets	Homework	Quizzes	Exams	Final
5%	10%	10%	10%	40%	25%

Letter grades are determined according to the following grading scale.

A	$91\% \leq N \leq 100\%$	B-	$76\% \leq N < 79\%$	D+	$61\% \leq N < 64$
A-	$88\% \leq N < 91\%$	C+	$73\% \leq N < 76\%$	D	$55\% \leq N < 61\%$
B+	$85\% \leq N < 88\%$	C	$67\% \leq N < 73\%$	D-	$52\% \leq N < 55\%$
B	$79\% \leq N < 85\%$	C-	$64\% \leq N < 67\%$	E	$N < 52\%$

I reserve the right to modify these in special cases and to decide if a curve is needed.

Student Code: 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 detailed 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`

Addressing Sexual Misconduct: Title IX makes it clear that violence and harassment based on sex and gender (which Includes sexual orientation and gender identity/expression) is a civil rights offense subject to the same kinds of accountability and the same kinds of support applied to offenses against other protected categories such as race, national origin, color, religion, age, status as a person with a disability, veteran's status or genetic information. If anyone has been harassed or assaulted, students are encouraged to report it to the Title IX Coordinator in the Office of Equal Opportunity and Affirmative Action, 135 Park Building,581-8365, or the Office of the Dean of Students, 270 Union Building, 801-581-7066. For support and confidential consultation, contact the Center for Student Wellness, 426 SSB, 801-581-7776. To report to the police, contact the Department of Public Safety, 801-585-2677(COPS).

Campus Safety: The University of Utah values the safety of all campus community members. To report suspicious activity, call campus police at 801-585-COPS (801-585-2677). Students will receive important emergency alerts and safety messages regarding campus safety via text message. For more information regarding safety and to view available training resources, including helpful videos, visit `safeu.utah.edu`.

Wellness Statement: Personal concerns such as stress, anxiety, relationship difficulties, depression, cross-cultural differences, etc., can interfere with a student's ability to succeed and thrive at the University of Utah. For helpful resources contact the Center for Student Wellness at `www.wellness.utah.edu` or 801-581-7776.

Classroom Social Equity: Class rosters are provided with the student's legal name as well as "Preferred first name" (if previously entered in the Student Profile section of students CIS account, which can be managed at any time). While CIS refers to this as merely a preference, we will be using the name and pronoun that feels best for each student in class or on assignments. Please advise us of any name or pronoun changes (and update CIS) so we can help create a positive and respectful learning environment. We strive to be ethical, kind, fair, inclusive and respectful in the classroom and expect students to behave likewise. In this regard, we request that:

- If a student has any sort of anxiety disorder, TBI, PTSD, C-PTSD, or any other challenge that might cause being called out in class or working in groups psychological harm, then please do tell us, discreetly. We will confidentially accommodate any such request.
- If a student's preferred name is different than the student's legal first name, please log into Canvas and go to Account (on far left)- Settings and change your Display Name to be the name you prefer to be addressed by.
- If there is ever a time that a student feels this course or the curriculum is not equitable, please email me or meet with me to discuss such concerns.

If you need any assistance or support, please reach out to the LGBT Resource Center. `https://lgbt.utah.edu/campus/faculty_resources.php`

Diversity Statement: It is our intent that students from all diverse backgrounds and perspectives be well served by this course, that students' learning needs be addressed both in and out of class, and that the diversity that students bring to this class be viewed as a resource, strength and benefit. It is our intent to present materials and activities that are respectful of diversity: gender, sexuality, disability, age, socioeconomic status, ethnicity, race, and culture. Suggestions are encouraged and appreciated. Please let us know ways to improve the effectiveness of the course.

I reserve the right to change the policies stated in this syllabus at some point in the semester. If I do make a change to a policy, I will announce it in class and send the change in email or post an Announcement on Canvas.

Important Dates:

Class begins	August 19
Last Day to add without a permission code	August 23
Last Day to add/drop	August 30
Labor Day holiday	September 2
Exam 1	October 4
Fall break	October 6-13
Last Day to withdraw	October 18
Exam 2	November 22
Thanksgiving break	November 28-1
Class ends	December 5
Reading day	December 6
Final exam	December 9, 10:30am-12:30pm
Grades due	December 20

Please check the academic calendar for more information pertaining to dropping and withdrawing from a course.

Weekly Topic List:

Week 1	1.3,1.5-1.7	Functions, Compositions, Exponential Function, Logarithms, Inverse Functions, Parametric Curves
Week 2	2.1-4	Velocity, Limits, Limit Laws , Continuity, Derivatives
Week 3	2.5-2.7	Relationship between a Function and its Derivative, Review limits.
Week 4	2.7-3.3	Derivatives of Polynomials and Exponential, Product and Quotient Rules, Derivatives of Trig Functions
Week 5	3.3-3.7	Chain Rule, Implicit Differentiation, Inverse Trig Functions, Log Functions, Review Differentiation
Week 6	3.8-4.1	Log Derivatives, Linear Approximation, Differentials, Applications
Week 7	4.2-4.3	Differentials, Related Rates, Max and Min Values, Exam 1
Week 8	4.3, 4.5-4-6	Derivatives and Shapes of Curves, l'Hopital's Rule, Optimization
Week 9	4.6-4.8	Optimization, Newton's Method, Antiderivatives
Week 10	5.1-5.5	Areas, Distances, Definite Integral, Fundamental Theorem of Calculus, Substitution Rule
Week 11	5.6-5.7, 5.10	Integration by Parts, Improper Integrals, Review Integration
Week 12	5.9,6.1-6.3	Approximate Integration, Areas Between Curves, Volumes, Volumes by Shells
Week 13	6.4-6.6	Arc Length, Average Values, Applications of Integration to Engineering, Exam 2
Week 14	9.1-9.4	Three Dimensional Coordinates, Vectors, Dot Product, Cross Product
Week 15	9.5-9.6	Equations of Lines and Planes, Functions and Surfaces, Review

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 !