MATH 1320-001, Engineering Calculus II

Summer 2019

Instructor:	Rebecca Hardenbrook	**Time:**	MTWHF 8:30 – 9:30 AM
Email:	rebeccah@math.utah.edu	**Place:**	WEB 1250

Course Page: This course is listed on Canvas and on my webpage: http://www.math.utah.edu/~rebeccah/.

Office Hours: LCB loft, TH 10:00 AM – 11:00 AM, or scheduled with me via email at a different time.

Main References: *Calculus: Concepts and Contexts 4th Edition*, by James Stewart (ISBN-13: 978-0-495-55742-5), about $180 new, $60 used from campus bookstore.

Prerequisites: A letter grade of "C" or better in MATH 1310 or 1311 OR AP Calc BC score of 3 or better OR Department Consent.

Department Course Description: Differential and Integral Calculus II, with a focus on applications and projects for engineers: integral expressions for moments, centers of mass, and work; infinite series and sequences; power series and Taylor series; vectors, dot and cross products, and the geometry of space; the calculus of vector functions and particle motion in space; differential calculus for functions of several variables, including linear approximation, partial and directional derivatives, chain rule, and multivariable optimization; multivariable integration in Cartesian and polar coordinates and applications.

Objectives: According to the University of Utah mathematics department, the objectives for this course are as follows.

- 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.

- Students will become skilled in computations and applications of infinite sequences and sums. Students will become familiar with the properties of infinite sums to either converge to a finite value or diverge to an infinite value, and will learn about methods to determine convergence. Students will be able to represent functions as a Taylor series, and use Taylor's theorem to approximate functions and estimate error from using finitely many terms of the Taylor series.

- Students will also learn important tools of calculus in higher dimensions. Students will become familiar with 2- and 3-dimensional coordinate systems, vectors and vector operations including the dot and cross product, and equations of lines, planes, and other surfaces. Students will also learn how to represent motion of objects in 3D using vector functions, how to represent velocity and acceleration using vector projections into tangential and centripetal coordinates of acceleration, and how to characterize curves

in space by computing arc length and curvature. For functions of 3D surfaces, students will be able to characterize aspects of surfaces and volumes using partial derivatives and the gradient vector. Partial derivatives will also be used to describe approximating tangent planes to points on surfaces, and how to compute derivatives of multi-dimensional function compositions can be performed using a multi-dimensional version of the chain rule.

- 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.

- 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.

Grading Policy: Homework (10%), Labs (20%), Daily Quizzes (5%), Midterm Exams (30%), Individual Project (10%), Final Exam (25%).

Grading Scale: Grades will be assigned based on the following scale: 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).
If I do need to curve the grades, I will simply shift everything down by a few points (whatever is necessary). I will not round individual grades. For example, a 92.99% is an A- and will not be deemed an A.

Important Dates:

Midterm 1 .... June 14, 2019
Midterm 2 .... July 5, 2019
Project Deadline .... July 26, 2019
Final Exam (**7:30 − 9:30 AM**) .... August 1, 2019

Class Policy: Due to various reasons, I have decided that our course will adhere to the following policies.

- Regular attendance and class participation is essential and expected. If you choose not to attend class, your chances of mastering the material are much lower.

- Six homework will be assigned throughout the semester as a way to measure your understanding of the material. These can be found in the File folder on Canvas, and the lowest score will be dropped. They will be assigned on Tuesdays and will be due the following Tuesday, with the exception of the last homework which will be due on a Friday and due the following Friday. Homework must be turned in at the beginning of class in-person.

- Quizzes will be assigned daily with the exception of holidays, lab days, and exam days. These will be assigned on Canvas, and the lowest five quiz scores will be dropped.

- Labs will be assigned every Thursday and due at the beginning of class on Thursdays, with the exception that the last one be due on the Monday before the final exam. They must be submitted in-person. If there is a holiday on Thursday, the lab will be due on the Wednesday before. In total, there will be 11 labs assigned and the lowest one dropped.

- Because of my policy on dropping scores, late homework, labs, and/or quizzes will not be accepted.

- A project will be assigned towards the middle of the semester and will be due the Friday before the final. There will be several choices for this project, all of which will have some sort of application of what we will learn in this course. This project should be completed individually, but I encourage you to discuss the project with your fellow classmates.

- Exams can not be retaken, regardless of the circumstances.

- If you have an emergent, extenuating circumstance that requires you take an alternate exam, it is your responsibility to talk to me, before the exam occurs, or as soon as possible. I allow exams to be taken early, but not late.

- It is expected that students will utilize any given materials designed for use before or after class for each lecture. These will be posted to the Canvas page for this class.

- I will provide, and expect from all students, respectful behavior in the classroom. Examples of disrespect include, but are not limited to, reading a newspaper or magazine in class, social chatting with your friend in class, texting or emailing during class, excessive use of your cell phone, or cuddling someone else in class. If you choose to be disrespectful with distracting behavior during class, please keep in mind that I will choose to stand for the students who are there to learn without disruptions, and I will take action to terminate your distracting behavior. Such action may not be desirable for you.

- I will not tolerate any cursing or negative ranting (for example, "math sucks) on any written work turned in, as such behavior is highly unprofessional. Such language will be penalized by that work being assigned a zero score, be it an assignment, quiz, or exam.

- I will post announcements to the class in Canvas and will hold you accountable for receiving that information. Please be sure to turn on your notifications in Canvas so you are alerted to announcements I make in Canvas as well as grade changes, discussion posts, etc.

- If you have questions about any exam/assignment grade, or you want to appeal the grading of the exam/assignment, you must turn it in to me within one week of the exam/assignment being turned back in class. I am happy to look over your appeal and/or questions and give my feedback in order to benefit your learning. I only require that it be done within a week from when I hand back the exam/assignment.

- If you cheat on any homework, project, quiz or exam, I will give you a zero for that grade. If the cheating is sever enough, I may decide to fail you from the class. Please note that the use (or even just pulling it out of your pocket) of a cell phone or any other electronic device during any in-class exam is considered cheating and cause for receiving an automatic zero. If you exhibit any behaviors that are unethical, like offering me a bribe to give you a better grade (even if you later claim you were joking), I will report your behavior to the Dean of Students.

- I hope to make this class as inclusive and equitable as possible. If you feel that I am not doing so, please email me or speak to me in person so that I can improve the course for all students!

Academic Honesty: Lack of knowledge of the academic honesty policy is not a reasonable explanation for a violation. Please be sure to inform yourself on the University of Utah's policy on academic honesty, which can be found in the student code at https://regulations.utah.edu/academics/6-400.php/.

ADA Statement: 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 this 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 you and the instructor 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.

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, veterans status or genetic information. If you or someone you know has been harassed or assaulted, you are encouraged to report it to the Title IX Coordinator in the Office of Equal Opportunity and Affirmative Action, 135 Park Building, 801-581-8365, 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 or request a safety escort call campus police at 801-585-COPS(801-585-2677). You 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 http://www.safeu.utah.edu/.

Learners of English as an Additional/Second Language: If you are an English language learner, please be aware of several resources on campus that will support you with your language and writing development. These resources include: the Writing Center (http://writingcenter.utah.edu/); the Writing Program (http://writing-program.utah.edu/); the English Language Institute (http://continue.utah.edu/eli/). Please let me know if there is any additional support you would like to discuss for this class.

LGBT Resource Center: The LGBT Resource Center at the U of Utah is located in Room 409 of the Olpin Union Building and is open to all students at the university. For more information about resources through the center or events, please visit their website at http://lgbt.utah.edu/. The LGBT Resource Center hours are M-F 8am-5pm, and 8am-6pm on Tuesdays.

Student Names & Personal Pronouns: Class rosters are provided to the instructor with the students legal name as well as "Preferred first name" (if previously entered by you in the Student Profile section of your CIS account). While CIS refers to this as merely a preference, I will honor you by referring to you with the name and pronoun that feels best for you in class, on papers, exams, group projects, etc. Please advise me of any name or pronoun changes (and update CIS) so I can help create a learning environment in which you, your name, and your pronoun will be respected. If you need assistance getting your preferred name on your UIDcard, please visit the LGBT Resource Center Room 409 in the Olpin Union Building, or email bpeacock@sa.utah.edu to schedule a time to drop by.

Veteran's Center: If you are a student veteran, the U of Utah has a Veterans Support Center located in Room 418 in the Olpin Union Building. Hours: M-F 8-5pm. Please visit their website for more information about what support they offer, a list of ongoing events and links to outside resources: http://veteranscenter.utah.edu/. Please also let me know if you need any additional support in this class for any reason.

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

I reserve the right to make any and all changes to this syllabus. Any changes will be announced on the course Canvas page.