Course Information: MATH 1320, Engineering Calculus II is a 4-credit semester course.

Class Time and Place: 10:45am–11:35am Mondays, Tuesdays, Wednesdays, Fridays in LCB 225
In addition to class every student has to attend a lab section. There are two possible times: Thursday 9:40am–10:30am in HPR N 226 and Thursday 10:45am–11:35am HPR N 226

Important Dates:
- Drop Deadline: January 18
- Midterm #1: February 8
- Midterm #2: March 8
- Withdraw Deadline: March 8
- Midterm #3: April 5
- Course Final: April 29


Course Overview: The calculus is a set of tools to analyze the relationships and functions essential for modeling physical processes important in science and engineering applications.

Grading: The grades of homework, exams, and finals will weight as follow in your overall average.

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<thead>
<tr>
<th></th>
<th>Weight</th>
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<tbody>
<tr>
<td>Labs</td>
<td>15%</td>
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<tr>
<td>Lab attendance</td>
<td>5%</td>
</tr>
<tr>
<td>Homework</td>
<td>15%</td>
</tr>
<tr>
<td>Quizzes</td>
<td>10%</td>
</tr>
<tr>
<td>Midterms</td>
<td>30%</td>
</tr>
<tr>
<td>Final</td>
<td>25%</td>
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The instructor reserves the right to change the grading scheme during the course of the semester. Students will be notified of any adjustments.

Labs: Each Thursday in the lab section a problem sheet is distributed. This will be due at the beginning of the next lab section. The problems will be applied questions and more involved problems. Students are expected to work on the current problem sheet in the lab section supported by the TA. These problem sheets will be graded for correction. The two lowest scores will be dropped.

Lab attendance: You are required to attend the lab sections and participate in discussions with your peers. If you do not participate you will not get full credit for attendance. Two lab attendances will be dropped.

Homework: There will be homework due each Friday at the beginning of class. For each section, there will be problems, you have to turn in, and additionally some suggested ones, that you should do practice but do not have to turn in. All of the problems you turn in, will be graded for correctness. Homework will only be accepted in class, so no electronic copies or late homework. Additionally at times you will get Canvas quizzes which will count towards your homework grade. Roughly the lowest 20% of the scores will be dropped.
Quizzes: Each Friday in class a 10 minute quiz is given (unless there is a midterm). During the first half each student works on their own. For the second half students may talk to each other. A quiz will contain 2–3 short problems about the topics covered by the homework. The questions will be taken from textbook examples, class examples, assigned problems or problems very much like those problems. There will be no make-up or alternate quizzes offered for any reason. The two lowest scores will be dropped.

Class scriber: At the beginning of each class one student will recap the previous class in one minute. The student will be selected at the end of the previous class. Every student is expected to do this once during the semester. This will count as much as one quiz and will not be dropped.

Midterms: There will be three 50-minute midterm exams given on selected Fridays. These will cover the topics discussed after the previous midterm, for the first midterm from the beginning of the semester. There will be no retakes of exams, for any reason. You may take an alternate exam if you talk to me about it first and explain the emergent, extenuating circumstances that make it necessary. It is 100% your responsibility to communicate with me as soon as is possible, before the exam occurs (or as soon as possible). Talking to me after the problem will be sufficient reason for me to allow you to get a zero on that test. I reserve the right to make alternate exams more difficult than the scheduled exam.

Final exam: A two-hour comprehensive exam will be given. The final exam is scheduled for Monday April 29 from 10:30am-12:30pm in LCB 225. There won’t be an early final for any reason.

If a curving is necessary, everything will be shifted by a few points. Final course letters will be determined as follows:

<table>
<thead>
<tr>
<th>Grade</th>
<th>Percentage</th>
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<tbody>
<tr>
<td>A</td>
<td>100-93</td>
</tr>
<tr>
<td>A-</td>
<td>92-90</td>
</tr>
<tr>
<td>B+</td>
<td>89-87</td>
</tr>
<tr>
<td>B</td>
<td>86-83</td>
</tr>
<tr>
<td>B-</td>
<td>82-80</td>
</tr>
<tr>
<td>C+</td>
<td>79-77</td>
</tr>
<tr>
<td>C</td>
<td>76-73</td>
</tr>
<tr>
<td>C-</td>
<td>72-70</td>
</tr>
<tr>
<td>D+</td>
<td>69-67</td>
</tr>
<tr>
<td>D</td>
<td>66-63</td>
</tr>
<tr>
<td>D-</td>
<td>62-60</td>
</tr>
</tbody>
</table>

The instructor retains the right to modify this grading scheme during the course of the semester; students will, of course, be well notified of any adjustments.

Review and practice: A week prior to an exam (midterm and final) a detailed list of all the relevant topics and practice problems about these will be posted. The lab the day before the exam will not have a new problem sheet, instead you have the opportunity to ask questions and review the material.

Regrading: Regrading inquiries must be addressed within a week of the assignment being returned.

Canvas: Canvas will be used for posting course announcements, homework assignments, grades, files and any relevant supplementary material. You are also welcome to make use if the Canvas discussion board to discuss course problems or topics. You can access the Canvas page through CIS or by logging in at utah.instructure.com. Students should check the Canvas page regularly for course information and resources. Email notifications and correspondence will be sent to the student’s UMail address ([u-number]@utah.edu); this email account must be checked regularly.

Communication: If you have any questions or concerns, please contact be. You can either talk to me in person, before or after class or during office hours, or send me a message through Canvas or send me an email. I am happy to talk to you.
**Teaching and learning methods:** In this class active learning methods will be used. For part of the semester the class will be flipped: The students are expected to do some reading at home which then will be discussed during class. During other parts of the semester the class will be more traditional. During both formats there will be group work and discussions with the whole class. Everyone is encouraged to participate.

**Technologies:**
- In class geogebra will be used to graph functions and 3-dimensional objects. Geogebra is an open-source tool and can either be downloaded or used from a browser (https://www.geogebra.org/classic). There will be homework problems that students are expected to graph and turn in through Canvas. Students are free to decide which program they use to do these.
- Calculators will not be allowed on exams or quizzes. They may be used on homework or labs, but you should still write out the details of your computation. It is in your best interest not to become too dependent on your calculator.

**Extra Help:** Do not hesitate to come to my office during office hours or by appointment to discuss any aspect of the course.

**Tutoring Center:** The T. Benny Rushing Mathematics Tutoring Center (room 155, the lower level between JWB and LCB) offers free tutoring. Beginning the second week of classes, tutoring will be available from 8am to 8pm Monday through Thursday and 8am to 6pm on Friday.

**Private Tutoring:** If you want to hire an outsider tutor (for a fee), you can find a list of such people through the math department.

**Departmental Videos:** The math department has a full set of lecture videos which you are welcome to use to supplement our course material. On Canvas you will find to which section these videos correspond. The videos can be found at http://www.math.utah.edu/lectures/

**Prerequisites:** You have to meet one of the following criteria to take this course:
- C or better in MATH 1310 or MATH 1311
- AP Calc BC score of 3 or better
- C or better in MATH 1210 and by being concurrently enrolled in the MATH 13 that covers the material in MATH 1310 that is missing from MATH 1210
- Departmental consent

**Expected Learning Outcomes:**

**The tools and skills:**
- 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 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 introduced to the tools of integration of multivariate functions over areas and volumes and will learn the use of iterated multiple integration. Similar to single-variable integration, students will learn the technique of multidimensional change-of-variables to transform the coordinates over which integration proceeds by utilizing the Jacobian. Specifically, students will learn how to transform between an integral over an area or volume in Cartesian coordinates to polar or spherical coordinates, respectively.

Problem solving fluency: • 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.

Strategies for success: • Attend class regularly and participate: Ask questions and join discussions.

• Come prepared to class: If reading was assigned do it. Look over the notes from the previous class.

• Do the homework the same day the material is covered. Do not postpone until it is due. The same for the lab. Start early then you have more time to discuss the problems with your classmates and ask questions.

• Form study groups with other students.

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 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).

**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.

**Student Names & Personal Pronouns:** I will honor you by referring to you with the name and pronoun that feels best for you in class, on papers, exams, 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.

**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. Students 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, plagiarism, and/or collusion, as well as fraud, theft, etc. Students should read the Code carefully and know they are responsible for the content. According to Faculty Rules and Regulations, it is the faculty responsibility to enforce responsible classroom behaviors, and I will do so, beginning with verbal warnings and progressing to dismissal from and 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

**Additional Policies:** I reserve the right to change my policies stated in this syllabus at any point in the semester. If I do make a change to a policy, I will announce it in class and put an announcement on Canvas.