MATH 1321-001: Accelerated Engineering Calculus II Fall 2017
Course Syllabus

Instructor: Ziwen Zhu
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Lectures: M,W,F 10:45am-11:35pm, BU C 210; T 10:45am-11:35pm, JFB 102

Office Hours (Tentative): M 2:00pm-3:00pm, W 3:30pm-4:30pm, or after Tuesday's class

Course Web Page: http://www.math.utah.edu/∼zzhu/1321Fall2017.html

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

Important Dates (Please schedule accordingly):

- **Midterm 1:** Monday, Sep. 18th (in class)
- **Midterm 2:** Monday, Oct. 30st (in class)
- **Final Exam:** Thursday, December 14, 2017, 10:30 am - 12:30 pm

Course Information: Math 1321, Accelerated Engineering Calculus II 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: Prerequisites: "C" or better in MATH 1311 OR
AP Calculus BC score of 4 or better OR
Department Consent.

Course Description: Completion of Math 1321 is equivalent to completing the entire three semester Calculus I, II, III sequence. Vectors in the plane and in 3-space, differential calculus in several variables, integration and its applications in several variables, vector fields, and line, surface and volume integrals, Green's and Stokes Theorems.

Expected Learning Outcomes: The goal of Math 1321 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 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.

2. 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.

3. 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.

4. Students will become familiar with vector functions that define vector fields in the plane and 3D space, particularly conservative vector fields, represented by the gradient of a scalar function, which are important for gravitation and electrostatics. When masses or charged particles are pushed through fields such as these along curved paths, the work done can be computed as a line integral. Students will learn how the fundamental theorem for line integrals for conservative vector fields reduces the integral to valuation of the potential at the endpoints of the path.

5. Students will learn the fundamental vector calculus integral theorems of Green, Stokes', and Divergence. The notion that one-dimensional integrals of functions can be computed from evaluation of a related function (e.g., an antiderivative or a potential function) on the end-points of the interval of integration generalizes to integration over areas, surfaces and 3D domains. Integration over these domains can be computed by evaluation on the boundary of an area, surface, or volume of the appropriate function. Students will learn meaning and computation of the curl and divergence of a vector field and utilize them to compute area and volume integrals using Green's and Stokes', and the Divergence theorems, respectively. Students will also learn how these theorems represent conservation principles for physical vector fields important in gravitation and electric fields.

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 Monday (except the first week and the midterm weeks). In the first week, we will have a short review of single-variable calculus and do a review quiz on Tuesday. It will be about arithmetic problems, limits, derivatives and integrals. The purpose of the first quiz is to evaluate the preliminary math level of the whole class, so as long as you participate in the quiz and try your best, you will get full score for that quiz. 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, December 14, 2017, 10:30 am - 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 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`

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 your 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.