Multivariable Calculus, MATH W53 2018

Four (4) semester credits. This course counts the same as the usual version of Math 53 to satisfy prerequisite or major requirements.

Course Description

This course has the same content as the usual, face-to-face version of Math 53. The official description in the course catalog is as follows: Parametric equations and polar coordinates. Vectors in 2- and 3-dimensional Euclidean spaces. Partial derivatives. Multiple integrals. Vector calculus. Theorems of Green, Gauss, and Stokes. The purpose of this course is to introduce the basic notions of multivariable calculus which are needed in mathematics, science, and engineering.

Prerequisites

Math 1B or equivalent. In particular, students should have a solid command of single variable calculus including trigonometric and exponential functions, limits and continuity, differentiation, the chain rule, integration and its applications, the fundamental theorem of calculus, substitution, and integration by parts.

Course Objectives

After successfully completing this course, you will be able to

- Demonstrate understanding of the basic notions of multivariable calculus that are needed in mathematics, science, and engineering

Instructor Information, Contact, Office Hours, & Communication

Course Instructor

Instructor Name: Professor Michael Hutchings

Office Hours:

- See announcement

Graduate Student Instructors (GSIs)

While the instructor will interact with the whole class and will oversee all activities and grading, as well as being available to resolve any issues that may arise, the GSIs will be your main point of contact. Your GSIs are responsible for assisting you directly with your questions about assignments and course requirements, as outlined in the Assignments and Calendar. The GSIs will also facilitate ongoing discussion and interaction with you on major topics in each module. You can always send a message to your GSI through the course message system.

GSI Name:

- Archit Kulkarni
- Felix Gotti
- Nic Brody
- Jeremy Meza
- Thunwa Theerakarn

Office Hours:

- See announcements

Office Hours

The course instructor and GSIs will offer virtual office hours, where students can communicate in real time (synchronously) using the Chat tool. While these chats are optional they can be valuable for discussion, answering questions, and reviewing for exams. Chats are optional; no points are awarded for participation. In person office hours may be offered at the discretion of the instructor and GSIs.

The session will be for one hour. However, if no one shows up in the first 10 minutes, then that office hour will be cancelled.

Course Mail

Make sure to check the Course Mail for messages from the instructor. You can access course email within the Learning Management System by clicking on the Inbox link or choose to have your course mail forwarded to your personal email account or your cell phone.

Course Materials and Technical Requirements

Required Materials

Calculus: Early Transcendentals by Ian Stewart, 8th edition.

A custom edition of the book, containing only the chapters needed for the course and costing much less than the full book, is available from Cengage and the Cal Student Store. The custom edition is entitled Multivariable Calculus: Early Transcendentals for UC Berkeley, 8th edition, and its ISBN is 9781305749986. There are many other versions and editions of Stewart's Calculus; unfortunately these will not work with this course.

Technical Requirements

This course is built on a Learning Management system (LMS) called Canvas and you will need to meet the computer specifications listed in bcourse to participate within this online platform.

Technical Support

If you are having technical difficulties please alert the GSI immediately. However, understand that neither the GSIs, nor the professor can assist you with technical problems. You must call or email tech support and make sure you resolve any issues immediately.

In your course, click on the "Help" button on the bottom left of the global navigation menu. Be sure to document (save emails and transaction numbers) for all interactions with tech support.

Extensions and late submissions will not be accepted due to "technical difficulties."

Learning Activities

VERY IMPORTANT

You won't be able to access your course material until you read and make your pledge to Academic Integrity in the Orientation Module.

You are expected to fully participate in all the course activities described here.

1. Read the assigned sections of the textbook.
2. Watch and listen to the lecture presentations.
3. Answer the "Check Your Understanding" questions after each lecture segment.
4. Complete homework assignments.
5. Complete biweekly quizzes.
6. Read web-based announcements posted during the course.
7. (Optional but strongly recommended) Participate in online discussions on piazza.
8. (Optional but strongly recommended) Participate in online office hours.
9. Complete the final exam

Sections

For grading purposes, each of you has been assigned to one of the course GSIs and placed within his/her section. Your particular GSI will grade all of your work, as well as that of your section-mates, and engage with you in the course discussions. You can see whose section you've been placed in by exploring the "Section" column within the "People" page or by examining your discussion group's title, which includes your GSI's name

Modules

Part 1: Introduction to the course. Geometry of curves. (Stewart chapter 10.) Geometry of vectors, dot product, cross product. Planes and quadric surfaces. (Stewart chapter 12.) Vector-valued functions. (Stewart chapter 13.)

Part 2: Differentiation. Limits and continuity, partial derivatives, chain rule, directional derivative and gradient, optimization, Lagrange multipliers. (Stewart chapter 14.)

Part 3: Integration. Double and triple integrals in Cartesian, polar, cylindrical, and spherical coordinates, change of variables. (Stewart chapter 15.)

Part 4: Vector calculus. Line integrals and surface integrals, fundamental theorem for line integrals, Green's theorem, Stokes's theorem, divergence theorem. (Stewart chapter 16)

Part 5: Review and Final Exam. August 7 and 8 will be devoted to review and practice for the final exam on Thursday August 9.

Reading Assignments

Each module includes assigned readings relevant to each topic covered in that module.

Lecture and Check Your Understanding

There will be a number of short video lecture segments each week. Each lecture segment will be followed by one or more multiple choice questions to check your understanding of the material, with instant feedback and explanations of the answers. Sometimes these will be survey questions instead. Completion (but not correctness) of these questions counts towards the participation component of the grade. While the lecture segments can be viewed at any time, each lecture segment and its accompanying check your understanding questions must be completed before a fixed deadline to receive full credits.

Homework Assignments

Since extensive practice is essential for mastering this material, there will be a number of substantial homework assignments, which will be due twice a week. These will be given a pass/fail grade based on completeness. Collaboration on homework with fellow students is permitted, as long as each student writes their own solutions independently. The homework grade is determined by the percentage of homework assignments that are completed on time. (The lowest three assignments will be dropped. Here an "assignment" consists of the homework for one section of the course. Sometimes more than one assignment will be due on the same day.)

Participation

The participation grade is determined by the percentage of check your understanding questions (including those that are survey questions) that are answered (correctly or not) on time.

Quizzes

There will be two quizzes each week, on Mondays and Thursdays. However there will be no quiz on the first Monday or on the last Thursday. Quizzes will be similar to homework, except that they will be shorter and will be graded by the GSIs, who will provide detailed personalized feedback. Each quiz may be taken at any time during the

day for which it is assigned. There is a one hour time limit for completing the quiz, plus an additional hour for dealing with any technical issues in submitting it. Thus, after a quiz is started, it must be submitted within two hours. The quizzes will be "open book": the textbook and course materials may be used. However the internet and electronic devices may not be used except as needed to access the course materials. The lowest two quiz scores will be dropped.

Discussion Forums

General Discussion on Piazza

Students are encouraged to use Piazza to discuss questions of general interest regarding the course content. Messages not tied to any specific homework assignment should be posted with the tag "General Q and A". The GSI's and the professor will periodically check in and help answer questions.

Final Exam

The final exam will take place on Thursday August 9, 2018 at 9:00am - 12:00pm PDT. Students must take the final examination in person or possibly arrange to have the examination proctored if you cannot come to campus. For more information on getting a proctor, look at the Proctor Info on the left navigation menu. Off-site proctor applications must be submitted prior to July 13th, 2018 PDT. If you miss taking the final or try to take it in a manner for which you have not received permission, you will fail this class automatically

Reminder: Your Course End Date

Your course will end on August 10. As you work through the course, please keep the end date in mind, and if you want to save any commentary or assignments for future reference, please make sure to print or copy/paste those materials before your access ends.

Grading and Course Policies

Your final course grade will be calculated as follows:

Table 1: Final Grade Percentages

Category	Percentage of Grade
Homework *The homework grade is determined by the percentage of homework assignments that are completed on time. (The lowest three assignments will be dropped. Here an "assignment" consists of the homework for one section of the course. Sometimes more than one assignment will be due on the same day.)*	20%
Participation *The participation grade is determined by the percentage of check your understanding questions (including those that are survey questions) that are answered (correctly or not) on time.*	5%
Quizzes *The lowest two quiz scores will be dropped.*	25%
Final Exam *A passing grade (at least C-) on the final exam is required to pass the course*	50%

The four items above will be curved to a common scale, and then the curved grades will be averaged to determine the course grade.

There is no regrading of quizzes and the final exam. Grades cannot be changed unless an egregious error was made such as adding up the points incorrectly.

It is important to note that not all components are graded online and included in the online course grade book. Because of this, the online course grade book will not display your overall course grade at any given time or your final grade. It should simply be used to assess your performance on the components that are included within it. Your final letter grade will be mailed to you by the registrar's office.

Course Policies

Promptness

Homework assignments all have specific final due dates and times. You will not receive credit if assignments are submitted after the indicated due date.

Further, each online activity must be submitted through the course website by the due date. Fax or mail submission will not be accepted. Students who wait until the final hours prior to a submission deadline risk having problems with their ISP, hardware, software, or various other site access difficulties. Therefore, it is advisable to submit assignments and tests through the course website early. Students should plan accordingly and get into the habit of checking the course website several times each week, and submitting and posting early.

Academic Integrity

Cheating on exams and plagiarism are two common examples of dishonest, unethical behavior. Honesty and integrity are of great importance in all facets of life. They help to build a sense of self-confidence, and are key to building trust within relationships, whether personal or professional. There is no tolerance for dishonesty in the academic world, for it undermines what we are dedicated to doing - furthering knowledge for the benefit of humanity.

Incomplete Course Grade

Incomplete grades can only be given if (1) unanticipated circumstances (e.g.illness) prevent a student from completing the course, and (2) the student is otherwise passing with a grade of at least C-. In this case the student must make arrangements with the professor for completing the coursework before the start of the following spring semester. For example, if the missing coursework consists of the final exam, then one can make it up by taking the final exam for Math 53 at the end of the fall semester. Note that this will be with another professor, and their final exam might be more difficult.

Students with Disabilities

Any students requiring course accommodations due to a physical, emotional, or learning disability must contact the Disabled Students' Program (DSP). They will review all requests on an individual basis.

- Request your Disabled Student Program Specialist to send the instructor a formal request before the official course start date by email.
- In addition, notify the instructor and your Online Learning Support Specialist, which accommodations you would like to use.
    - Your Online Learning Support Specialist is Tracie Allen and her email is summer_online_support@berkeley.edu

End of Course Evaluation

Before your course end date, please take a few minutes to participate in the Course Evaluation to share your opinions about the course.

The evaluation does not request any personal information, and your responses will remain strictly confidential. A link to the evaluation will be made available via bCourses on July 26th, 2018 and will be available until August 8th, 2018. You will also be emailed a link to the course evaluation.

To access the course evaluation via bCourses:

- Enter the course in bCourses
- Choose Course Evaluation from the left-hand navigation menu.
- Complete evaluation and submit. Course Outline