

## **Multivariable Calculus, Math W53**

*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**

Prof. Michael Hutchings

## 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.

- TBD

## Office Hours

The course instructor and GSIs will offer virtual office hours. 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.

DAY	TIME (Pacific Day Time)	INSTRUCTOR/GSI
<b>Monday</b>	<ul style="list-style-type: none"><li>• See Announcement</li></ul>	<ul style="list-style-type: none"><li>• See Announcement</li></ul>
<b>Tuesday</b>	<ul style="list-style-type: none"><li>• See Announcement</li></ul>	<ul style="list-style-type: none"><li>• See Announcement</li></ul>
<b>Wednesday</b>	<ul style="list-style-type: none"><li>• See Announcement</li></ul>	<ul style="list-style-type: none"><li>• See Announcement</li></ul>
<b>Thursday</b>	<ul style="list-style-type: none"><li>• See Announcement</li></ul>	<ul style="list-style-type: none"><li>• See Announcement</li></ul>
<b>Friday</b>	<ul style="list-style-type: none"><li>• See Announcement</li></ul>	<ul style="list-style-type: none"><li>• See Announcement</li></ul>
<b>Sunday</b>	<ul style="list-style-type: none"><li>• See Announcement</li></ul>	<ul style="list-style-type: none"><li>• See Announcement</li></ul>

\* Office Hours schedule is subject to change. You will be notified when an update is made via Announcements.

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 on the Corner Help toolbar (see also [Canvas Overview Video](#)) or choose to have your course mail forwarded to your personal email account or your cell phone.

## Question & Answer Forum

Please use this forum to post questions about the course material, assignments, the learning management system or online homework. **The instructor/GSIs will monitor this forum**, but you should also feel free to post answers to help other students. These questions and answers can also be considered a sort of asynchronous office hour space since there are separate headings in Piazza for individual assignments.

## Announcements

Please be sure to adjust your settings so that you receive notifications when the instructor posts announcements in the course, they important notifications and should be viewed in a timely manner.

## Course Materials and Technical Requirements

### Required Materials

- Stewart, James. Calculus: Early Transcendentals, 8th ed.

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 these [computer specifications to participate within this online platform](#).

## Technical Support

If you are having technical difficulties please alert one of the GSIs 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. 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"**.

For 24/7 Tech Help Support: Click on the Help button at the bottom left of the global navigation menu.

## Learning Activities

### VERY IMPORTANT

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

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

1. Read the assigned textbook pages
2. Watch and listen to the lecture presentations
3. Complete "Check Your Understanding" questions
4. Complete homework assignments
5. 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 the class through the piazza discussions and office hours. 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: Preliminaries. 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 8 and 9 will be devoted to review and practice for the final exam on Thursday August 10.

## **Reading Assignments**

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

## **Lectures 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 credit.

## **Homework**

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 are shorter and designed to be taken in only one hour. You will be able to access the quiz at any point in the 24 hour time window and the use of your text is permitted. Quizzes will be graded by the GSI's, who will provide 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. Please see the online classroom for more detailed directions on taking quizzes.

### **Homework Discussion Forums**

As mentioned above, for each homework assignment, there will be an associated discussion forum on piazza. Before an assignment is due, hints and ideas for solving the problems may be posted here, but not answers. After an assignment is due, complete solutions may be discussed.

### **Late Work Policy**

No late assignments are allowed in this course. However, please note that the lowest two Quiz scores will be dropped.

### **Final Exam**

The final exam will take place on Thursday **August 10, 2017 at 9:00am - 12:00pm PST**. 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 14th, 2017**. 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.

### **Reminder: Your Course End Date**

Your course will end on **August 11th, 2017**. 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:**

Category	Percentage of Grade
Homework	20%
Participation	5%
Quizzes	25%
Final Exam	50%

**Table 1: Final Grade Percentages**

You must pass the final exam (with a grade of C- or better) to pass the course. 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.

The items are curved to a common scale, and then the curved grades will be averaged to determine the course grade. For students near the border between two course grades, a small amount of extra credit may be given for construction participation in the discussion forums.

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.

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 and discussion forum postings all have specific final due dates and times. You will not receive any 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. The multiple days allowed for submission are to accommodate the busy schedules of working professionals, not to accommodate procrastination. Students should plan accordingly and get into the habit of checking the course website several times each week, and submitting and posting early.

### **Honor Code**

The student community at UC Berkeley has adopted the following Honor Code: "As a member of the UC Berkeley community, I act with honesty, integrity, and respect for others." The expectation is that you will adhere to this code.

### **Collaboration and Independence**

Reviewing lecture and reading materials and studying for exams can be enjoyable and enriching things to do with fellow students. This is recommended. Collaboration on homework assignments is fine as long as each student writes their own solutions independently and acknowledges any collaboration.

## **Cheating**

A good lifetime strategy is always to act in such a way that no one would ever imagine that you would even consider cheating. Anyone caught cheating on a quiz or exam in this course will receive a failing grade in the course and will also be reported to the University Center for Student Conduct. Exams are to be completed without the assistance of other people, and without reference to texts, notes, and other materials. The expectation is that you will be honest in the taking of exams.

## **Plagiarism**

To copy text or ideas from another source without appropriate reference is plagiarism and will result in a failing grade for your assignment and usually further disciplinary action. For additional information on plagiarism and how to avoid it, explore the resources linked below:

[UC Berkeley Library Citation Page, Plagiarism Section](#)

[GSI Guide for Preventing Plagiarism](#)

## **Academic Integrity and Ethics**

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.

## **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 Littlejohn and her email is [summer\\_online\\_support@berkeley.edu](mailto:summer_online_support@berkeley.edu)

## End of Course Evaluation

Before your course end date, please take a few minutes to participate in our Course Evaluation to share your opinions about this course. You will be receiving the Course Evaluation via email. The evaluation does not request any personal information, and your responses will remain strictly confidential. You may only take the evaluation once. It will close August 11th, 2017 11:59pm (PT).