

Math 31BH Winter 2018: Honors Multivariable Differential Calculus

MWF 2-2:50pm, B412 AP&M
Professor D. Rogalski

1. CONTACT INFORMATION

Prof. Rogalski's Office: 5131 AP&M

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Class web site: www.math.ucsd.edu/~drogalsk/31.html. Check here for announcements, homework assignments, schedule of lectures, and other information.

Office hours: M1-2pm, Tu 3-4pm in 5131 AP&M (updated January 18)

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Section Meeting time: Th 4-4:50pm in 7421 AP&M

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Office hours: M 3-4pm in 7421 AP&M, W 3-4pm in 7218 AP&M (updated January 18)

• Course description

Math 31BH is the second quarter of UCSD's three-quarter honors multivariable calculus and linear algebra sequence. The main topic of this quarter will be differential calculus of functions of several variables.

• **Prerequisite** The prerequisite is having taken Math 31AH and received a B- or better. It is very unlikely that a student that did not take Math 31AH would have sufficient preparation for this class. Please come talk to me if you have any questions about getting into the class.

• Comparison with other courses

Each quarter of Math 31 replaces one course in our introductory calculus sequence. Math 31AH replaces Math 18, Math 31BH replaces Math 20C, and Math 31CH replaces Math 20E. In each case, the quarter of Math 31 covers all of the material in the the corresponding introductory course, as well as additional material, but emphasizing proofs and with more difficult homework and exams. If you complete only part of the year of Math 31, you will not need to take the lower division courses corresponding to the parts you did complete. Only if you complete the whole year of Math 31, you will also be considered as having passed out of Math 109 (Mathematical reasoning), which is otherwise a prerequisite for many upper division courses. A grade of at least B- in Math 31BH is needed to continue onto Math 31CH.

• **Textbook** The textbook will be *Multivariable Mathematics* by Theodore Shifrin. We will use it for the entire year of Math 31. If you have a used copy, be aware that some corrections have

been made to the most recent June 2017 printing. I will post on our website a list of the known errors in the previous printing.

The book integrates the material on linear algebra and multivariable calculus, but we will separate the topics by quarter. Because of this, the material for this second quarter will be found in several different chapters of the text: Chapter 2, Chapter 3, Section 4.5, and Chapter 5 (excluding Section 5.5 which we already covered last quarter). We will cover most of the material in those chapters and sections. The material in lectures is meant to complement the book, so you are expected to read the book as well as attending lecture.

- **Homework**

There will be two kinds of homework: written and online.

The written homework will consist primarily of proof-oriented problems. It will be assigned weekly and is to be submitted on Fridays **by 4pm** in the homework box for Math 31 in the basement of AP&M. The one lowest written homework score will be dropped. No late homework will be accepted.

The online homework will be calculation-oriented problems. The online problems will be through a system called WeBWork which checks your answers automatically. These problems will have a due date and then a reduced credit period when the assignment can still be completed, but for half credit. The web address for online homework is webwork.ucsd.edu, and your login is your UCSD Active Directory password.

As with all higher mathematics courses, the most important part of the course is the homework. You cannot prepare for the exams properly without working through the homework carefully and completely. It is important to start homework early and work on it over the week.

While the online homework gives you feedback immediately, the written homework will be graded and given back at the following week's section. Only certain problems will be graded but you are expected to understand all problems. No solutions to the written homework will be provided; you can ask about problems you didn't understand in section or in office hours, or discuss them with a friend until you feel confident that your solution is correct.

Note that handing in a homework solution copied directly or paraphrased from an online source, or from a friend's solution, is academically dishonest. The homework you hand in should reflect your own understanding of the problems.

- **Writing Proofs**

Mathematical writing is still writing, just of a special kind. You should treat your proofs as you would short essays for an English class. In particular, you should write in full sentences, with good grammar, and avoid overuse of mathematical symbols.

Here is my suggested strategy for producing good homework write-up. Once you think you have figured out how to do a problem, first write out a draft solution. Often in the process of doing this, you will realize there may be minor gaps in your idea you have to fix. In the draft solution, you can cross things out, start again, insert paragraphs, etc. Once you are satisfied, you can create a neat, organized write-up of your final solution.

The idea of writing a proof is to convince someone else that what you claim is true really is; understanding why it is true yourself is only part of the process. A wandering, disorganized proof, even if it seems to contain some of the right ideas, cannot be considered correct if the grader cannot follow your argument.

Learning good proof-writing is a gradual process. It may take a while for you to figure out what style of proof we are looking for. Keep in mind the examples from the book, class and section, and use any feedback from the graded homework to improve.

- **Exams**

Updated January 18: Due to the difficulty in finding a two hour slot for exams that doesn't conflict with the schedule of a significant number of students in the class, we will revert to having (shorter) midterm exams in class. They will be Wednesday January 31 and Wednesday February 21 at our usual lecture time in our usual room. Please verify at this time that you are free at the times of the midterm exams, and let me know about any time conflicts that you cannot easily fix yourself by rescheduling the other activity.

The final exam is Monday March 19 from 3-6pm.

Please bring a blue book to each exam. No books, notes, calculators, phones, or other aids may be used during exams. The final exam will be cumulative.

- **Office Hours**

Both I and your TAs will have several office hours a week where we will be available for your questions. If you need to see one of us and can not make a scheduled office hour, please e-mail one of us to set up an appointment.

- **Grading**

Your final average will be calculated using the following grading scheme: Online Homework 10%, Written Homework 20%, Midterm 1 15%, Midterm 2 15%, Final Exam 40%.

Your final grade will be *at least as good* as the grade given by the following standard scale:

97	93	90	87	83	80	77	73	70	60
A+	A	A-	B+	B	B-	C+	C	C-	D

The actual grading scale will likely be more generous than this (that is, “curved”). In most math classes, the average grade usually some kind of B, but the average grade in Math 31 may well be higher.

- **Collaboration and Academic Honesty**

You are welcome to discuss the written homework problems with other students. The write-up you hand in should be your work alone in your own words, however, and should be written while you are by yourself. While it is also OK to seek hints from classmates that have figured out problems on which you are stuck, you will learn the most if you think about these problems hard on your own first and don’t give up too quickly.

As mentioned above, copying or paraphrasing the finished writeup of a homework problem in whole or in part from a classmate or from any other source such as the internet, and then handing it in as your own work, constitutes academic dishonesty. As usual, copying from or talking with a classmate during an exam, or using books, notes, calculators, phones or any other aids during an exam is also dishonest and is not allowed.