MUSA 74: Transition to Upper Division Mathematics

University of California, Berkeley Spring 2020

Instructors: Aidan Backus, Katie Lamar, Ning Mckenzie, Chris Randall, Andrew DeLapo
Monday and Friday 10am-12pm, 20 Barrows Hall

Course Email: musa74decal@gmail.com

Course Website: https://musa.berkeley.edu/musa74.html

Office Hours: Office Hours will be held after class and by appointment. Also, each instructor has MUSA Office Hours that are listed here, https://musa.berkeley.edu/office.html.

Piazza: We will create a Piazza page for this course. You can ask questions as well as answer your peer's questions. The instructors will also monitor the page and provide help as well. Please don't post or request entire solutions to homework problems on Piazza. If you are stuck on a homework problem then determine which portion of the problem is confusing and then ask a specific a question that will help clarify the concepts.

Course Material:
The MUSA 74 Course Notes can be found here, https://musa.berkeley.edu/musa74.html. The course notes may be edited throughout the term and additional exercises may be added as well. You will be notified if any changes do occur. The course will follow the MUSA 74 Course Notes very closely and your problem sets will be made up of the exercises found throughout the text.

Optional Texts:
This is a list of various interesting and useful books that may be helpful throughout this course. You can find most of these texts online or in the UC Berkeley Mathematics and Statistics Library.

Calculus Texts:

- Tom Apostle, *Calculus Volume 1: One Variable Calculus with an Introduction to Linear Algebra*
- Tom Apostle, *Calculus Volume 2: Multi-Variable Calculus and Linear Algebra with Applications to Differential Equations and Probability*
- Jerrold Marsden, Anthony Tromba, *Vector Calculus*

Discrete Mathematics Texts

- Kenneth Rosen, *Discrete Mathematics and its Applications*

Analysis Texts

- Walter Rudin, *Principles of Mathematical Analysis*
- Kenneth Ross, *Elementary Analysis*
- Charles Pugh, *Real Mathematical Analysis*

Algebra Texts

- David Dummitt, Richard Foote, *Abstract Algebra*
- Michael Artin *Algebra*

Course Overview:

The transition from lower division to upper division mathematics courses can be quite daunting even to a very experienced student. Unlike other subjects, the difference between lower and upper division courses in mathematics can be quite overwhelming; the two main culprits being writing proofs and abstract concepts. In this course we will address these issues head-on. In particular, we will learn how to write proofs while developing good mathematical style. We will also give students more familiarity with the mathematical objects appearing in Math 104 and Math 113.

MUSA 74 is a **2-unit class** which is intended for students who have no familiarity with writing proofs, and aren't sure if they're prepared enough for upper-division classes. In particular, we strongly recommend that the class is taken alongside Math 53, 54, or 55. We officially assume no prerequisites other than a little calculus (at the level of Math 1A), though we will also appeal to Math 53, 54, and 55 for a few examples. In order to ease the transition, we plan to focus on more of the abstract concepts found in calculus, linear algebra, and differential equations. We will delve into these concepts further by focusing on the proofs that arise when constructing these ideas. By the time you complete this course, you will be comfortable with writing proofs at the level required by the core upper-division sequence of Math 110, Math 113, Math 104, and Math 185.

We want to encourage a welcoming and inclusive learning environment. Questions, curiosity, and collaboration are all highly encouraged, and dismissive attitudes are strongly discouraged. Math is a difficult subject, and confusion is not a sign of weakness. If students would like help outside of class, they are highly encouraged to ask the course facilitators to meet one-on-one. The course facilitators also hold office hours that can be found here, https://musa.berkeley.edu/office.html.

Student Learning Outcomes:

1. Students will be able to read and write proofs at the level of a strong upper-division mathematics major.
2. Students will be comfortable utilizing the language of mathematics in various settings including asking questions and collaborating with peers in upper division mathematics courses.
3. Students will have the skills necessary to read and work through an undergraduate mathematical text.
4. Students will be familiar with naive set theory, field theory, advanced calculus, and other topics of their choice at a level appropriate for an upper-division mathematics major.
5. Students will be familiar with many important proof techniques, including but not limited to casework, contradiction, induction, and compactness.

MUSA 74 Corequisite:
Students are expected to also be enrolled in Math 53, 54, and/or 55 along with MUSA 74. If you aren't enrolled in Math 53, 54, and/or 55 and you still want to enroll in MUSA 74, please reach out to one of the instructors.

Grading Policy:

Homework (40%) Attendance (60%)

Grade: Passed ..... 70% or above
Grade: Not Passed ..... Below 70%

A grade of incomplete will only be given when the student is unable to complete the required work due to exceptional circumstances (illness, accident, death in the family, etc.), and their work up until that point has been satisfactory (passing).

Lecture Information and Attendance Policy:
Lectures will be held on Mondays and will be centered around introducing new material. The last 30 minutes of lecture will focus on reviewing past homework problems. If you don't attend the lecture section or you are more than 10 minutes late (10 minutes after Berkeleytime) then you will be marked as absent. You will be allowed two unexcused Monday absences for the Fall term that won't be factored into your overall Attendance Grade. In the case of emergency, an absence will only be excused if you provide documentation.

Discussion Information and Attendance Policy:
Friday discussion sections will give you the opportunity to apply the concepts you've learned in a group setting. Each group will be assigned a different problem on a worksheet and then the group will present their solution to the class after a dedicated amount of time for solving it. Discussion and feedback is encouraged during presentation for solutions, as there are many ways to prove most statements. Your group's problem set will be graded on both completion and accuracy.The second half of Friday's discussion section will be a homework study session. This is a great time to get help from your instructors and peers! If you don't attend the discussion section or you are more than 10 minutes late (10 minutes after Berkeleytime) then you will be marked as absent.

Homework Policy
Problem Sets will be released on Friday and will be due the following Friday in class. You will be required to turn in your problem set each Friday in person unless you email us beforehand and make other arrangements. Problem Sets will be graded on both completion and accuracy. If you believe that there is a grading error on one of your problem sets please contact us as soon as possible. You have two weeks from the due date of the assignment to request a re-grade. Lastly, if you use other resources or you collaborate with another student to complete your problem set, please indicate so on your problem set. We encourage you to work with one another and seek out additional resources; however, we won't tolerate plagiarism. For example, you are encouraged to discuss solutions, but the write-up should be individual.

Important Dates:

First Day of Class	January 21, 2020
Last Day to Add/Drop	February 12, 2020
Last Day of Class	May 15, 2020

DSP Accommodations:
If you need any type of accommodations throughout the semester, please contact one of the instructors as soon as possible and be sure to provide a copy of your DSP Accommodation Letter.

Academic Honesty
The Mathematics Department, and in particular, the instructors in this course, expect that students in mathematics courses will not engage in cheating or plagiarism. The following has been adapted from the Math Department web page to suit our course.

What does cheating mean?
Broadly speaking, cheating means violating the policies of a course or of the university in order to gain an unfair advantage over fellow students. A particular kind of cheating is plagiarism, which means taking credit for someone else's work. Cheating and plagiarism hurts your fellow students in the short term, they hurt the cheater in the long term, and they will not be tolerated. Instructors can easily spot when problem sets look unusually similar, or have similar (wrong or correct) answers, calculations, ideas, or thought structure. If you write the correct answer to a computational problem without any justification or with a bogus justification leading to that answer, this raises strong suspicions that you cheated, on top of not receiving any credit anyways due to the lack of correct justification. We encourage MUSA 74 students to collaborate on problem sets and seek out additional help from tutors, online resources, and other texts. If you use other resources or you collaborate with another student to complete your problem set, please indicate so on your problem set. We encourage you to work with one another and seek out additional resources; however, we won't tolerate plagiarism.

What to do in a case of cheating?
If you suspect that other students are cheating, you should immediately inform one of your instructors. Students may be cheating in ways that the instructors have never even heard of before(unlikely, but possible). Even if you don't mention any names, the sooner you inform the instructor what is going on, the sooner they can take measures to put a stop to it. You can further report any cheating at: http://sa.berkeley.edu/conduct/reporting/academic.

Resolution to cheating.
If you are suspected of cheating, the instructor may pursue a variety of actions depending on the particular nature of the incident. If you accept responsibility for academic misconduct, the matter can often be resolved between you and the instructor with possible academic sanctions ranging from losing points on a problem set to failing the class. The instructor may also send a report to the Mathematics Department and/or Center for Student Conduct. It is not necessary for the instructor to determine whether the student(s) has a passing knowledge of the relevant factual material. It is understood that any student who knowingly aids in cheating is as guilty as the cheating student.