

Math 2001 — Discrete Mathematics

SPRING 2016 SYLLABUS

Class Location: MUEN E417, MWF 2:00–2:50 PM

Instructor: T. Alden Gassert

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Office Hours: M 3:00–4:30 PM, Tu 9:00–10:00 AM, F 3:00–4:00 PM, and by appointment.

Text: *Book of Proof* by Richard Hammack. A pdf of the book is available at his website:

<http://www.people.vcu.edu/~rhammack/BookOfProof/BookOfProof.pdf>

Paperback copies are also available for purchase at the bookstore (~\$15).

About the course: There are three main themes to this course: developing mathematical literacy, understanding discrete mathematical objects, and training effective thinking.

As in any subject, the sharing of ideas depends on our ability to convey and comprehend concepts in an effective manner; mathematics is no exception. We need a vocabulary (definitions) to express our ideas (theorems), and we must be able to explain why our ideas are valid (proof). This structure should be familiar, however in this course, we will make these arguments in accordance with the rules of the English language. That is, our ideas and explanations will be written and spoken in full English sentences. As you progress as a mathematician, you will find that mathematics has less to do with solving equations (as you have been doing in virtually every math class up till now) and more to do with the exploration of conceptual ideas, thus necessitating the use of the English language.

The mathematical content of this course are objects and concepts that apply broadly to many areas of mathematics. Some of these topics include sets, relations, (injective, surjective, and bijective) functions, and modular arithmetic. For the most part, our sets are discrete (loosely, this means we can count the items in the set), and our relations and functions will be maps between discrete sets. (Hence the name of the course.)

Finally, and perhaps most importantly, is training ourselves to think effectively. What does this mean? Broadly, this means accepting challenges and having the courage to fail. It means learning from mistakes. How can we gain the most out of our mistakes? On one hand, this involves understanding why we failed. On the other, we need to fail in a way that provides some meaningful information, and that begins with asking the right questions. How do we ask right questions? That is entirely experiential. There is no innate knowledge that points us in the correct direction. So be bold and question.

Course goals:

- The primary goal is to develop a foundation of mathematical literacy. By the end of the course, I expect that you have a command of the standard styles of proof, and that you write with proper mathematical (and English) syntax and grammar.
- Moreover, I expect you to read and understand the proofs of your peers, or find counter-arguments if the proofs are incomplete.

Assessment:

10% Exercises — assigned daily

10% Class participation — class discussion, in-class assignments, group assignments

30% Quizzes — at least one per week, generally short and at the beginning of class

30% Proof portfolio — your writing will be tracked over the course of the semester

20% Final Exam

Academic integrity: Learning is a collaborative experience, however all work must be your own (or your group's if it is a group assignment). Violations to the academic honor code will be penalized with a minimum of a 20 point deduction to your final grade subject to the finding of the Honor Code Office.

Special accommodations, religious observances, etc.: If you qualify for special accommodations due to a disability, you will need to provide to me a letter from Disability Services. Please attend to this matter in a timely fashion.

Please inform me as soon as possible if you will miss an exam or a homework assignment due to religious observance so that we have time to arrange a reasonable accommodation.