MATHEMATICS 2001
SPRING 2015
INTRODUCTION TO DISCRETE MATHEMATICS

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Monday, Wednesday, Friday 9:00-9:50 am, ECCR 108.

This course has a D2L Website
It is your responsibility to notice online announcements.

This is NOT a standard Lecture-Exam-Homework Course!

Course Goals

First, to become proficient in the culture and practice of theoretical mathematical thinking; to:

(1) understand written mathematics,
(2) communicate mathematics (principally in typset writing),
(3) enjoy mathematics,
(4) study mathematics effectively in an independent way,
(5) cultivate mathematical creativity,
(6) synthesize and use novel definitions,
(7) create novel proofs.

Second, to become proficient in the basic use of:

(1) logic,
(2) set theory,
(3) functions,
(4) induction,
(5) further topics (potentially number theory, game theory, graph theory).

These goals are complementary. The so-called 'content' of the course actually serves two purposes: material on which to practice the first goal, and

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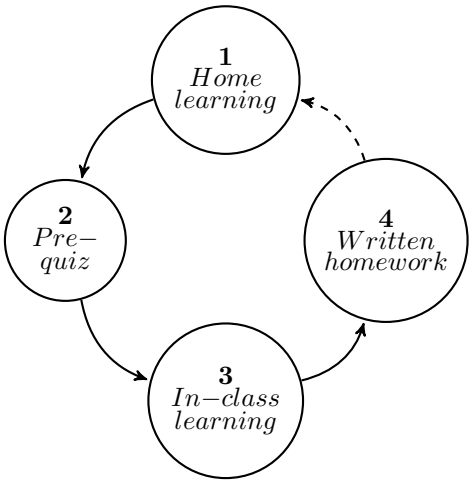
useful knowledge that will be called upon in later mathematics courses. So it is essential to the course, but even *more* essential is to learn the 'theoretical' way of thinking.

This course has a different structure than a usual mathematics course. What we will be doing is a version of *flipping the classroom*. Flipping, or *inverting* the classroom is a term for taking the passive lecturing out of the classroom and using classroom time for active work. Using classtime for interaction between students and teacher is more efficient use of this precious resource. We will do worksheets, clicker questions, and group work. In addition, a goal of the class is to learn how to learn on your own, so you will practice home learning between each lecture.

1. The Course Cycle

For each unit of material (roughly one Section of the textbook), there is a cycle of learning:



(1) **Home learning**: Videos, readings, activities.
(2) **Pre-quiz**: Online quiz (D2L) on your home learning.
(3) **In-class learning**: Clarifications, review and examples of home learning, lecture, worksheets, clicker questions, activities.
(4) **Written homework**: To be turned in next class.

The Boulder Faculty Assembly at the university has made a motion (BFA-X-M-9-0105) which specifies that **"An undergraduate student should expect to spend approximately 3 hours per week outside of class for each credit hour earned."** I will try to respect this workload.

Course Schedule

Please see D2L for daily assignments.

Final Exam: Thursday, May 7, 2015, 4:30 pm - 7:00 pm

Materials

Textbook. *Mathematics: A Discrete Introduction*, 3rd Edition, Edward A. Scheinerman.

A copy will be on reserve at the library.

Clickers. You must purchase a clicker if you do not already have one.

Calculator is not required.

Doing math: interacting and finding help

Virtual Office Hours: You may email math and course questions to

`kstange@math.colorado.edu`.

Questions of interest to your classmates will be anonymized and answered by the instructor on D2L, for the benefit of all students, unless you request otherwise.

Instructor's Office Hours:

- **Regular Office Hours:** TBA, 2 hrs per week.
- **Floating Office Hour:** For students who cannot make the regular office hours, I will announce an extra office hour fitting the schedule of those that ask; this hour may change each week and will be posted online and open to all.
- **Private Office Hour:** You can always make a private appointment. This is only for private matters.

Discussion Boards. Are available on D2L, where you can write in LaTeX (math symbols; click 'Advanced' and investigate the editors). I **strongly** recommend discussion of any questions you may have.

Study Groups. Please take a moment now, while reading this syllabus, to get the names and contact info of the people nearest you in the class. It will be to your advantage to locate those in your dorm and hold study sessions.

Name	Contact Info
.....	.....
.....	.....
.....	.....
.....	.....

Other resources. Please see the website for other resources.

Grading

The grading breakdown will be as follows:

Final Exam	30
In-class Quizzes (7 total, none will be dropped)	35
Daily Homework (daily, 8 will be dropped)	25
Pre-quizzes (daily, 8 will be dropped)	10

Final Exam

The final exam will be cumulative. It will be designed to take two hours to complete, but you will be given 2.5 hours to write it.

In-Class Quizzes

Every second friday we will have a twenty-minute quiz. These will be designed to be very similar to the final exam, and serve to help you and me detect how well you are preparing for it.

Daily Homework

This aspect of the course is going to be adaptive. Typically, I will assign problems from the textbook. Sometimes, I may assign other types of things, like a brief writing assignment.

Solutions to textbook problems will be available online. Please keep in mind that in a course like this there are many correct solutions, so the textbook solution is only an example.

Important: the homework will *not* cover every 'type' of problem that may appear on the final exam. In fact, this course doesn't consist of a finite number of 'types' of problems. Instead, you are expected to actually do as many problems from the text as you need to in order to attain *conceptual* understanding.

Pre-Quizzes

These are administered through D2L. You must take these before class as part of your home study. They are typically multiple-choice conceptual problems. They will not be timed, and you may take them twice, so that you can examine the problems as you work through your home study. After the first time you take the quiz, you will be given hints/feedback on the problems you got wrong (it is graded by computer).

Typing Mathematics

Learning to type mathematics is also part of the mathematician's skill-set. Homework is required to be typed and handed in on D2L unless otherwise noted. LaTeX is the standard tool for this, and we will learn LaTeX in class (the software is free and you can use it online also). However, you may use any software you like (e.g. most modern word-processors have equation editors). If the homework is not typed, it will not be graded.

Allowable and non-allowable sources of help: how not to cheat

If you violate any of the rules below, you are in violation of the Honor Code of the University of Colorado. These rules are designed to ensure that you are *learning* during the process of doing your coursework.

They are also designed to ensure that you are not engaging in *academic dishonesty*.

An *outside resource* is any outside source of information. The following are outside resources: any website, a tutor, other students in the class, discussions on D2L, hints from me in office hour, other books, etc. The only resources that are not *outside* resources are your textbook and course notes.

The rules **for graded homework** are:

(1) **You must make a good-faith effort on all problems without outside resources first**. Furthermore, you must make use of resources only as much as needed. That means, if you're stuck, get a little hint, not a solution. If you have a tutor or a more knowledgeable friend help you, they must use the socratic method – asking helpful questions to lead you toward your goal. They must not simply show you the solution. If you are collaborating with other students in the class, then you may share ideas and explain to one another, but you must not simply have one student do a problem and then explain the answer.
(2) **You must cite all outside resources used**. For websites, you must give the URL. You must explain explicitly in what manner they were used (e.g. *I wasn't able to complete the final step until I got the hint that I could try proof by contradiction from X.*).
(3) **You may not write a solution in the presence of any outside resources**. Doing a problem comes in two stages: figuring it out (including scratchwork), and typing it up for submission. You can only use outside resources during the first stage. In the second stage, you must write it up using only your brain, using your *understanding* (**not** memorization or notes). In particular, if you use a website or a friend, you must *understand* what they are explaining and then *synthesize and recreate* it by yourself. Rote memorizing is not allowed. If you follow these rules, your solution will never resemble the source very closely (because your understanding will always reexplain it differently). If I see any answers that are copied (word-for-word or even just very similar in structure), I will know you have broken this rule.

The rules **for pre-quizzes** are:

(1) **You may not use outside resources to help you.** You can use outside resources to help you understand textbook material in general in preparation for the quiz, but you may not directly seek help on the quiz problems themselves. That means you must not discuss quiz problems and answers with other students. You can use your textbook and course notes.

The pre-quizzes are designed to ensure there is a place where you are struggling alone before you get to the in-class quizzes. This is so that you can measure whether or not you are understanding the material.

The rules **for in-class-quizzes and exams** are:

(1) **You may not use resources at all to help you.** Period. No textbook, no notes, no phones, no whispers, etc.

Failure to comply with these rules may result in a course grade of zero.

Missed or late work

(1) **Homework or pre-quizzes.** Missed work receives a zero. For homework and pre-quizzes, several of the lowest scores are automatically dropped (details above); this should cover any unexpected illnesses or other legitimate reasons to miss work. If you are missing more than two classes due to illness, etc., please contact me immediately to help get on track. If it is more than two weeks missed, this may require that you take an incomplete, or other intervention. If you know you must miss a class (e.g. a religious observance), complete the homework and pre-quiz ahead of time.
(2) **In-class quizzes.** If you have a religious exception or other legitimate reason to miss an in-class quiz, please make arrangements with me **as soon as possible**. If you missed an in-class quiz without permission, you must supply a note specifically excusing your absence (i.e. 'Jane Doe *could not* attend the midterm because she swallowed a cat / was abducted by militant Pastafarians') from a doctor or the Office of the Dean of Students. In that case, **and only in that case**, appropriate grading adjustments will be made.

Special Requests

I am happy to accommodate disabilities or religious observances, or a request that I address you with a different name or pronoun than my roster indicates. Please contact me as soon as possible.

It's possible you suffer from math anxiety. Although fear of math is like fear of chocolate, even mathematicians can suffer from it! Please come talk to me.

University Policies

Please see the course website for University Policies concerning such matters as religious holidays, the Honour Code, harassment, etc.