

MATH 4320 – WINTER/SPRING 2015 – GENERAL INFORMATION

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Office hours: Tuesdays 10am–12pm

Course web page: <http://www.math.cornell.edu/~tsh/4320-Sp15.html>

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Lectures. MWF 1:25–2:15pm in 406 Malott.

The Course. Algebra is a major component in the foundation of many areas of modern mathematics, and plays an important role in computer science, chemistry and physics. We will study algebraic structures in mathematics, including groups, rings and fields. We will discuss factorization of polynomials and integers, congruences, and the structure of finitely generated abelian groups. Depending on your interests, and as time allows, we will finish the course with a look at Euclidean domains and Sylow's theorems, or a bit of Galois Theory.

As a prerequisite to the course, you should have taken one of MATH 3320, MATH 3360, MATH 4310 or MATH 4330, or have my permission. My interpretation of this is that the primary prerequisite is “mathematical maturity.” What I have in mind here is that you should be able to read and write proofs, you should be willing to persevere on a hard problem, and you should be willing to learn things on your own once in a while. I expect careful attention to detail on your part. You should prepare for class by reading the textbook ahead of time; I welcome your questions about the text, in class or even better, an email the night before. You should stop me in class if you do not understand something I have explained. Finally, you should spend significant time making sure that your homework solutions are clear and well written.

Please note, you may not receive credit for both this course and MATH 4340.

Textbook. The course text book is *A first course in abstract algebra*, by J.J. Rotman, Third Edition, published by Prentice Hall and with ISBN-10: 0131862677. I will supplement the book with extra examples and exercises. I expect we will spend one or two lectures per section, spelling out most of the details, particularly on points you ask me to address. We should cover Chapters 2 and 3 completely and will discuss parts of the Chapters 5 and/or 6 and applications, as time permits.

Please read the relevant sections of the text before class!! Your homework assignments and the course website will indicate which sections will be discussed on which days. Keep in mind that reading a math book is not like reading a novel. It helps to have scratch paper and a pencil handy while you're reading, so you can write out all the steps of a proof, check how the lemmas are being applied, and confirm the logical structure. Please bring questions to class, and even better, send me an email the night before!!

There are many other good abstract algebra resources out there. Whenever you feel stuck or confused with our text, please feel free to consult alternative treatments. Reading multiple accounts of one topic is often helpful. Some other texts you might consult include

- (1) Jeffrey Bergen, *A concrete approach to abstract algebra*. Academic Press 2009. ISBN-10: 0123749417.
- (2) David S. Dummit and Richard M. Foote *Abstract Algebra*. Third edition. Wiley. ISBN-10: 0471433349.
- (3) John Fraleigh, *A First Course in Abstract Algebra*. Pearson 2003. ISBN-10: 0201763907

These books are on reserve at the Mathematics Library on the fourth floor of Malott.

Warning: The lectures will follow the structure of our text fairly closely, but we may cover some material that is not in the book, and we may do some things differently. *What matters for the exams is what material is covered in lectures and in the homework!*

Academic integrity. As always, you are expected to abide by the [Cornell Code of Academic Integrity](#). This states, “A Cornell student’s submission of work for academic credit indicates that the work is the student’s own. All outside assistance should be acknowledged, and the student’s academic position truthfully reported at all times.”

Homework. There will be thirteen homework assignments over the course of the semester, each consisting of some true/false questions, computational exercises, and more theoretical questions whose answers require a proof. Assignments will be handed out on Wednesday, and will be due the following Wednesday in class. All handouts will be available on the web at

<http://www.math.cornell.edu/~tsh/4320-Sp15.html>

No late homework will be accepted, but I will drop your two lowest homework grades when I compute your final homework grade.

You may work together on your assignments, and you are encouraged to do so. However, you must write up your final solutions **by yourself**. Your work must be written neatly and legibly. Proofs should be written in complete English sentences. Your homework score will be determined not only by the correctness of the responses, but also by the quality of the writing.

Journals. An important component of upper level math classes is allowing yourself to pause and reflect on the material we have covered, ponder its significance, and identify what you understand and what may still be confusing for you. Journals are a way for you to do that, as well as for you to give me feedback about the course, how it’s going for you, and what’s generally on your mind about Cornell and the Math Department (the Good, the Bad and the Ugly all welcome!). ☺

Find a notebook that we will pass back and forth (even a bluebook will do!), and write your name and attach a photo of yourself on the cover. After your homework due on Wednesday, I’d like you to take a moment before class on Friday to reflect on the course and write me a paragraph or two in your journal. I expect entries mostly to be about math: excitement about a new connection you’ve seen between this class and something else you’re working on, something that came up in class that is still not resolved for you, general questions, and so forth. I welcome other entries, too, and for your first entry, I’d really like to hear about why you are considering this course and what you hope to get out of it, and maybe a paragraph of background about yourself. I’ll try to return the journals on Monday, so you get quick feedback. For full marks in the “Journal” component of your grade, I expect you to write something and hand in your journal at least 10 of our 14 Fridays.

Exams. There will be one prelim over two class periods and a final exam. Both exams will be timed in-class exams. You will not be allowed to consult any books or notes, nor use a calculator.

The exams will take place on the following dates.

Prelim Part I: Wednesday, March 4, 2015

Prelim Part II: Friday, March 6, 2015

Final Exam: Date TBA by registrar in February

Warning: There will be no make-up exams, except in extreme circumstances. In the rare case that a make-up exam is granted, it will probably be an oral examination.

Grading policy. The course components will be weighted as follows:

Homework – 30%

Participation / Journals – 5%

Prelim – 30%

Final – 35%

If you have questions about homework, exams, or grades, please come talk to me during my office hours or send me email.