

SPRING 2018 MATH 4400/6400 COURSE SYLLABUS

PETE L. CLARK

Course: Math 4400/6400: Number Theory

Instructor: Professor Pete L. Clark, Ph.D.

Lectures: MWF 10:10-11 am, Boyd 323

My Office: Boyd 502

Office Hours: TBA

Course text: *Number Theory: A Contemporary Introduction*, by Pete L. Clark. Available at math.uga.edu/~pete/4400FULL.pdf

Topics covered: There is *much more material* in the text than we can cover in a one semester undergraduate course. The *core topics*, that we will certainly cover, are:

- Chapter 1: The Fundamental Theorem and Some Applications
- Chapter 2: Pythagorean Triples
- Chapter 3: Quadratic Rings
- Chapter 4: Quadratic Reciprocity
- Chapter 7: The Pell Equation
- Chapter 8: Arithmetic Functions
- Chapter 10: The Primes: Infinitude, Density and Substance

In terms of additional topics, for now at least I would like to cover:

- Chapter 13: Minkowski's Convex Body Theorem
- Chapter 14: The Chevalley-Waring Theorem

and some (further) material on quadratic forms (perhaps taken from Chapters 18 and 19).

Course credo: I hope to give a course in which you will learn a lot and in which you will have a lot of fun. I took a summer course in number theory as a high school student in 1992 and then an undergraduate course in 1996. I loved both of these courses, but I would have had even more fun if we had covered certain topics more deeply. Now I am myself a number theorist, so I have in many cases the luxury of choosing to present material in ways that seem more conceptual, more powerful, and more modern than standard textbook presentations. Of course as a research mathematician, this is my idea of fun (more so than, say, Fibonacci numbers). But in case you are not planning to go on to graduate study in number theory, the course doesn't serve as a prerequisite to anything else, so you should be taking it for fun too. If you're not having fun, let me know, and I will do what I can to help, for instance, by allowing you to take a more historical approach.

Course grade:

Homework: 50%

Midterm: 20%

Final: includes a final exam and/or a final project 30%

The midterm will occur before the withdrawal deadline of Monday, March 19.

As for the final: it is likely that the final project will be mandatory and the final exam will be optional, taken by those who want a chance to increase their course grade. Please stay tuned for more details.

Master's level: Every homework set has problems marked **G** (for “graduate”): students taking the 6400 course must complete sufficiently many of these problems (to be specified on each problem set). Students at the 6400 level are expected to do a more ambitious final project.

More on homework: Homework problems will be posted on the course webpage. **It is your responsibility to check the webpage often enough to stay apprised of what homework has been assigned and when it is due.**

You are encouraged to discuss the homework problems with other students in the course. Learning to explain clearly your own reasoning and understand the reasoning of others are closely related to the goals of our course. However, you should make sure that your written work is your own and is independent of that of other students. A good rule of thumb is to talk about your work with others, write on the blackboard, and take notes from these discussions as needed, but not to look directly at the writeups of the other students.

Late work and makeup policy: Late homework will not be accepted. Rather, some (positive!) number of homeworks will be dropped.

Attendance Policy: The official attendance policy of the university states: *Students are expected to attend classes regularly. A student who incurs an excessive number of absences may be withdrawn from a class at the discretion of a professor.*

Final Exam: Wednesday, May 2, from 8 am until 11 am in Boyd 323.

The Mandatorium: I have been informed that *all UGA course syllabi* must contain the following paragraphs:

As a University of Georgia student, you have agreed to abide by the University's academic honesty policy, A Culture of Honesty, and the Student Honor Code. All academic work must meet the standards described in A Culture of Honesty found at: www.uga.edu/honesty. Lack of knowledge of the academic honesty policy is not a reasonable explanation for a violation. Questions related to course assignments and the academic honesty policy should be directed to the instructor.

The course syllabus is a general plan for the course; deviations announced to the class by the instructor may be necessary.