MATH 25: NUMBER THEORY
FALL 2018

JOHN VOIGHT

COURSE INFO

- **Lectures**: Monday, Wednesday, Friday, block 11 (11:30 a.m.–12:35 p.m.)
- **x-period**: Tuesday, block 11X (12:15–1:05 p.m.)
- **Dates**: 12 September 2018 – 13 November 2018
- **Room**: 105 Kemeny Hall
- **Instructor**: John Voight
- **Office**: 341 Kemeny Hall
- **E-mail**: jvoight@gmail.com
- **Instructor's Office Hours**: Monday 4:00–6:00 p.m. and Tuesday 9:00–10:00 a.m., or please make an appointment by email
- **Course Web Page**: http://www.math.dartmouth.edu/~m25f18/
- **Prerequisites**: Math 8, or equivalent. If you are unsure about your preparation, please talk to the instructor!
- **Required Texts**: David Burton, *Elementary number theory*, 7th edition, 2012.
- **Recommended Text**: Kevin Houston, *How to Think Like a Mathematician: A Companion to Undergraduate Mathematics*, 2009.
- **Grading**: Grade will be based on reading and class participation, daily homework, weekly homework, short exams, and a final exam (see below).

COURSE CATALOGUE DESCRIPTION

The great mathematician C. F. Gauss once wrote "Mathematics is the queen of sciences and number theory is the queen of mathematics." Number theory is that part of mathematics dealing with the integers and certain natural generalizations. Topics include modular arithmetic, unique factorization into primes, linear Diophantine equations, and Fermat's Little Theorem. Discretionary topics may include cryptography, primality testing, partition functions, multiplicative functions, the law of quadratic reciprocity, historically interesting problems.

LEARNING OUTCOMES

By the end of this course, you should be able to:
(1) Understand of the basic structures of number theory: define terms, explain their significance, and apply them in context;
(2) Solve mathematical problems: utilize abstraction and think creatively; and
(3) Write clear mathematical proofs: recognize and construct mathematically rigorous arguments.

Academic Honor Principle

Cooperation on homework is permitted (and encouraged), but if you work together, do not take any paper away with you—in other words, you can share your thoughts (say on a blackboard), but you have to walk away with only your understanding. In particular, write the solution up on your own. Please write on your assignment the names of any other collaborators you worked with.

Plagiarism, collusion, or other violations of the Academic Honor Principle, after consultation, will be referred to the The Committee on Standards. If you have any questions as to whether some action would be acceptable under the Academic Honor Principle, please speak to me beforehand.

Expectations

Mathematics requires active participation.

Before each class period, please read the assigned section and arrive ready to share what you have learned and what remains confusing. Class meetings will involve lecture and other activity in a variety of formats, and you will get the most out of each class day if you arrive ready to ask questions.

In all settings, collaborate thoughtfully and ask questions respectfully: everyone should be able to participate.

Grading

Your achievement in the course will be assessed through:

(1) Reading and class participation (5%)
(2) Daily homework (5%)
(3) Weekly homework (40%)
(4) Short exams (15%)
(5) Final exam (35%)

The median grade in Math 24 is historically B+/A-: we set high expectations in this course!

Exams

There will be two short exams and one final exam (with both take-home and in-class components) in the course. The short exams will be taken during x-hour on the following dates:

• Short exam #1: Tuesday, 9 October 2018
• Short exam #2: Tuesday, 30 October 2018

Please put these into your calendar right away and let me know by the end of the second week if you have a conflict. The in-class final exam is currently scheduled for

Sunday, 18 November 2018, 3:00–6:00 p.m.

Homework

The homework assignments will be posted on the course webpage. Late homework is not accepted (absent exceptional circumstances). However, since everyone has a bad week, your lowest written homework grade will be dropped.

The daily homework will be assigned each day for the next class period and we will discuss it at the top of class. Please bring a red pen and mark any corrections or comments on the assignment as we discuss. You will be asked to turn in all of these daily homeworks at the end of the term with a self-assessment.

Standard weekly homework assignments will be typically due on Wednesdays. Please refer to the course webpage for links and further information.

Student Accessibility Needs

Students with disabilities who may need disability-related academic adjustments and services for this course are encouraged to see me privately as early in the term as possible. Students requiring disability-related academic adjustments and services must consult the Student Accessibility Services office (205 Collis Student Center, 646-9900, `Student.Accessibility.Services@Dartmouth.edu`).

Once SAS has authorized services, students must show the originally signed SAS Services and Consent Form and/or a letter on SAS letterhead to me. As a first step, if you have questions about whether you qualify to receive academic adjustments and services, you should contact the SAS office. All inquiries and discussions will remain confidential.

Mental Health

The academic environment at Dartmouth is challenging, our terms are intensive, and classes are not the only demanding part of your life. There are a number of resources available to you on campus to support your wellness, including your:

- Undergraduate Dean (http://www.dartmouth.edu/~upperde/);
- Counseling and Human Development (http://www.dartmouth.edu/~chd/); and the
- Student Wellness Center (http://www.dartmouth.edu/~healthed/).

Religious Observances

Some students may wish to take part in religious observances that occur during this academic term. If you have a religious observance that conflicts with your participation in the course, please meet with me before the end of the second week of the term to discuss appropriate accommodations.

Syllabus

A full schedule is available on the course webpage.