MATH 17:
AN INTRODUCTION TO MATHEMATICS BEYOND CALCULUS
THE ABC CONJECTURE
SPRING 2019

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**: 25 March 2019 – 29 March 2019
- **Room**: 343 Kemeny Hall
- **Instructor**: John Voight
- **Office**: 341 Kemeny Hall
- **E-mail**: `jvoight@gmail.com`
- **Instructor's Office Hours**: Monday 4:00–5:00 p.m. and Tuesday 12:00 noon–1:00 p.m. (when no x-hour), or please make an appointment by email.
- **Course Web Page**: `http://canvas.dartmouth.edu/courses/32764`
- **Prerequisites**: Math 8 or advanced placement into Math 11.
- **Required Texts**:
  - Tom Wright, *Trolling Euclid*, 2016.
  - Joseph Silverman, *A Friendly Introduction to Number Theory*, 4th ed., 2017.
- **Grading**: Grade will be based on occasional homework, class participation, and a final project.

Course Catalogue Description

Gives prospective Mathematics majors an early opportunity to delve into topics outside the standard calculus sequence. Specific topics will vary from term to term, according to the interests and expertise of the instructor. Designed to be accessible to bright and curious students who have mastered BC Calculus, or its equivalent. This course counts toward the Mathematics major, and is open to all students, but enrollment may be limited, with preference given to first-year students.

Course Topic

The *abc* conjecture states that if a, b, and c are relatively prime integers satisfying $a + b = c$, then a, b, c cannot all have many repeated prime factors. In this course, we will make this conjecture precise, consider polynomial analogues, and discuss the controversy surrounding the announced proof of the conjecture by Shinichi Mochizuki.

Learning Outcomes

By the end of this course, you should be able to:

(1) Understand some basic structures of algebra and number theory: define terms, explain their significance, and apply them in context;
(2) Solve mathematical problems: utilize abstraction and think creatively; and
(3) Discover mathematical patterns and then 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, you must write the solution up on your own. Please acknowledge any cooperative work at the end of each assignment.

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. Arrive prepared to share what you have learned and to ask about 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) Class participation (30%)
(2) Homework (25%)
(3) Final project (45%)

Homework

Please refer to the course webpage for assignments and further information. Late homework is not accepted (absent exceptional circumstances). However, since everyone has a bad week, your lowest written homework grade will be dropped.

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 (Carson Hall, Suite 125, 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.