

PHILOSOPHY OF MATHEMATICS

Philosophy 319, Fall 2023
Scott Hall 214, M/Th 10:20–11:40
office hours Th 9:20–10:20 & by appt

What is mathematics about? Is it about a realm of nonphysical, objectively real entities? Is it just about symbols? Is it about our own minds? Do we know the truth about mathematics, and if so, how? Why is mathematics so useful in science? In this course we will address these and other philosophical questions about mathematics.

Prerequisites

The official prerequisites are intro philosophy and intro logic. Comfort with mathematics will make certain parts of the course easier, but I won't presuppose any particular knowledge of mathematics. If you don't meet one of the official prerequisites but are interested in taking the class, please contact me. (For example, the relevant bits of introductory logic are covered in many mathematics and computer science classes.)

Readings

The only required text is a draft of a book I am writing, which will be available on Canvas. Near the beginning of the semester it might be nice to read through *Mathematics: A Very Short Introduction*, by Timothy Gowers, available at Barnes & Noble—a wonderful (and short) book on the nature and practice of mathematics. But this is only a suggestion, not a requirement.

Requirements

Two exams (40% each), plus a 6–10 page paper (20%), due on **December 11 at 10:20am**. The first exam will be in-class on **October 30**. The second exam, which will cover only the second half of the course, will be on **December 21, at 8:00am**, in our regular classroom. (That's early in the morning! Maybe we could start at 9am; we'll discuss that later.)

The paper must be turned in via Canvas. Late papers will be penalized as described here: https://tedsider.org/teaching/215/lateness_policy.pdf. (Short version: two day grace-period with no lateness penalty; 2.5 points per day subsequently; exceptions only for

documented serious circumstances; technological mistakes are not excuses.) Please don't plagiarize, whether in the traditional way or by using ChatGPT. It's wrong (plus you'll probably get caught). Missed exams will receive a grade of zero except in documented serious circumstances.

Course website

The course website (containing handouts, announcements, etc.) is here:

http://tedsider.org/teaching/math/phil_math.html

And the Canvas site is here:

<https://rutgers.instructure.com/courses/239721>

Learning goals

The goals of this course are to learn the main epistemological and metaphysical challenges raised by mathematics, to learn some of the main attempts to meet these challenges that have been historically significant, to thereby deepen students' understanding of and appreciation for mathematics, and to develop, through wrestling with these issues, students' skills of critical thinking and abstract reasoning.

Schedule

All readings are in my book draft unless otherwise noted. The schedule may be revised; please consult the latest version of the syllabus, which will always be posted on the course website.

- 9/7 *Intro*. Chapter 1
- 9/11 *Platonism*. Chapter 2
- 9/14 *Kant*. Chapter 3
- 9/18 *NonEuclidean geometry*. Chapter 4
- 9/21 ...continued
- 9/25 *Mill*. Chapter 5
- 9/28 *Abstraction*. Chapter 6.
- 10/2 *Modern logic*. Chapter 7
- 10/5 *Logicism: Frege*. Section 8.1

10/9 ...continued
10/12 ...continued
10/16 *Logicism: neoFregeanism*. Section 8.2
10/19 ...continued.
10/23 *Foundations and crisis*. Chapter 9. Optional reading: Gowers, chapter 2; <https://personal.us.es/josef/pcmCrisis.pdf>
10/26 *Term and game formalism*. Sections 10.1–10.2
10/30 **Midterm exam**
11/2 *Term and game formalism* continued
11/6 *Deductivism*. Section 10.3
11/9 *Hilbert's program*. Section 10.4
11/13 *Gödel's theorems*. Chapter 11
11/16 ...continued
11/20 *Set-theoretic platonism*. Chapter 12
11/21 (Tuesday) ...continued
11/27 ...continued.
11/30 *Field's nominalism*. Chapter 13
12/4 ...continued.
12/7 *Structuralism*.
12/11 ...continued. **Paper due**
12/21, 8am Second exam