Philosophy of Mathematics

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Philosophy 319
Tu, Th 1 - 2.20, online (Zoom link on Canvas site).
Office hours: Tu 2.30 and by appointment, online.

Synopsis

Mathematics seems to be about a mysterious realm of abstract objects which aren't located in space or time (numbers, sets, functions, points, graphs, and so on). Is it? Or is it really about something else: the concrete world of physical objects, or the symbols written in mathematicians' notebooks, or our own minds? Or is it perhaps about nothing at all: is mathematics just a game, or a piece of fiction, or somehow metaphorical? We will consider these and related questions, such as: how can we know about mathematics, and why is it so useful in science?

Prerequisites

The only prerequisite is Philosophy 201/202 (Intro Logic), but at least one other philosophy class is strongly recommended. Comfort with mathematics will help, but no particular knowledge of mathematics is required.

Readings

There is no required text for this course, and all the readings will be available on the Canvas site. However, the schedule is loosely based on Stewart Shapiro's introductory textbook *Thinking about Mathematics: The Philosophy of Mathematics*, and I strongly recommend that you buy a copy of this book if you can. It will also be helpful if you spent some time early in the semester reading through *Mathematics: A Very Short Introduction* by Timothy Gowers — a really enjoyable and accessible little book about the nature and practice of mathematics.

Requirements

Attendance will be taken at each meeting, and your attendance record together with participation in classes will count for 15% of your grade. The rest will be made up of writing assignments: there will be short expository assignments/reading responses (no more than 300 words each) around every other week (20%), a midterm paper of 1500-2000 words, due in Week 9 (25%), and a final paper of 2500-3000 words, due in the final week (40%).

Learning Goals

The main aim of this course is to familiarize students with the key philosophical issues that arise within mathematics, and with the historically significant attempts to address these issues. Students should thereby develop a deeper understanding and appreciation of mathematics, as well as improving their ability to think critically, to engage in abstract reasoning, and to analyze, construct and present philosophical arguments.

Guidelines

- Every week there will be around 1-2 readings assigned (usually 20-30 pages total.) Doing the reading is important for being able to follow and participate in class. You should budget around 4 hours of work outside class per week; if it's taking you significantly less, you probably aren't reading carefully enough. You should come to class prepared with comments and questions on that week's material; I expect there to be lively discussions!

- I highly discourage you from missing classes, not only because it will affect your participation grade but also because many topics discussed in class will be presupposed later on. If you have some legitimate reason to miss class, please email me in advance to let me know. I'll be happy to meet outside of class if you need help catching up, and I also plan to make recordings of the classes available.

- All writing assignments must be done completely on your own and turned in via Canvas. **Late assignments will be penalised 2% per day; assignments over a week late will not be accepted.** Exceptions only for documented serious circumstances; technological mistakes are not excuses.

- Don't cheat! Your writing will run through plagiarism software, and penalties can be severe (automatic failing grade, and possibly worse.) You can consult Rutgers' academic integrity policy here: http://academicintegrity.rutgers.edu.

- Please make use of the office hours! I'm there to help you; if there's anything from class discussion you want to clarify – or you have any other questions – come along. If you can't make the time, just get in touch and I'll be very happy to schedule an appointment. It is especially a good idea to discuss your ideas with me when it comes to writing your midterm and final papers.

Schedule

This is provisional and will change; the latest version will always be posted on Canvas.

Introduction (Week 1)
Shapiro §§2.1-3

Platonism (Weeks 2 - 4)
The Fregean Argument
Shapiro §§3.1-2
Linnebo, 'Platonism in the Philosophy of Mathematics', §§1-2 (Stanford Encyclopedia of Philosophy)

The Epistemological Challenge
Benacerraf, 'Mathematical Truth'
Clarke-Doane 'What is the Benacerraf problem?' (excerpts)
Liggins 'Is there a good epistemological argument against Platonism?'

Kantianism (Week 5)
Shapiro §§4.1-2
Gowers, *Mathematics: a very short introduction*, ch.6

Empiricism (Weeks 6 - 9)
Mill
Shapiro §4.3

Godel and Maddy
Maddy, 'Perception and Mathematical Intuition' (excerpts)
Shapiro §8.1, 8.3

Quine and Indispensability
Shapiro §8.2
Colyvan, 'Indispensability Arguments in the Philosophy of Mathematics' (SEP)
Saatsi, 'The Enhanced Indispensability Argument'

Logicism (Weeks 10 - 12)
Frege
Shapiro §5.1, §5.4

[Midterm paper due]

Formalism (Weeks 13 - 14)
Shapiro §§6.1-4

[25/11 no class - Thanksgiving]

Nominalism (Week 15)
Shapiro §9.1
Field, *Science without Numbers* ch.1

[Final paper due]