

# Philosophy of Mathematics

John Dougherty

WiSe 2022/23

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Meeting:	Wednesdays, 12:00–14:00 (c.t.) Ludwigstr. 31 / 021
Tutorial:	Fridays, 12:00–14:00 (c.t.)
Office Hours:	Thursdays, 14:00–16:00, or by appointment Ludwigstr. 31 / 131
Email:	<a href="mailto:john.dougherty@lrz.uni-muenchen.de">john.dougherty@lrz.uni-muenchen.de</a> <a href="mailto:Nicola.Bonatti@campus.lmu.de">Nicola.Bonatti@campus.lmu.de</a>

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## Overview

**Description** This course is an introduction to some philosophical issues concerning mathematics. Mathematics is philosophically fascinating for many reasons. Mathematics allows for certainty in a way that other sciences don't. Mathematical knowledge consists of a collection of proofs of true statements, each developed by a particular person reasoning on the basis of prior mathematical knowledge. The facts of mathematics are facts about objects and their relations—the fact that  $2 + 2 = 4$  is a fact about the numbers 2 and 4—but these objects are wholly unlike physical objects: they aren't physical, they exist outside of time, and more. But mathematics is also about the physical world, because it is used throughout science. Or, anyway, these all seem true. The first meetings of this course will review three general philosophical accounts of mathematics that try to make sense of these general features of mathematics in a way that fits in with our understanding of the world and ourselves. In the rest of the course we will use these general accounts of mathematics to investigate more specific philosophical issues in mathematics. We will also look at various features of contemporary mathematical practice that challenge the traditional accounts of mathematics with which we began.

**Objectives** By the end of the course, you should be able to (i) formulate one or more philosophical problems that arise from the distinctive features of mathematics and (ii) assess one or more strategies for solving these problems. Exhibiting ability (i) means giving a statement, in academic writing, of a question—or inconsistency, paradox, puzzle, or similar—along with an explanation of why it poses a problem for some particular philosophical view. Exhibiting ability (ii) means describing, again in academic writing, a new or existing attempt to answer this question and explaining why this is or is not a plausible answer.

**Organization** The course consists of two kinds of meetings. The meetings on Wednesdays from 14:00–16:00 will be focused on lectures giving additional context for the readings, while the tutorial sessions on Fridays from 12:00–14:00 will be focused on providing time for discussion.

## Assessment

The evaluation for this course will be by means of a term paper submitted at the end of the semester. If you would like to submit a term paper, you must register through LSF during the registration period (16.01–27.01.2023) and submit it to me by email by the term paper deadline (TBD). Please note that extensions of this deadline are not up to me; if you need an extension, please contact Fabian Widerna ([f.widerna@lmu.de](mailto:f.widerna@lmu.de)) at the Prüfungsamt für Geistes- und Sozialwissenschaften (PAGS).

Your paper should be on a topic related to the philosophical dimensions of mathematics. I will distribute a list of suggested questions and grading criteria before the registration period. You may write your paper on topic not on that list; if you do, then I recommend speaking to me before writing the paper, so that I can advise on the topic and scope of your planned alternative. The term paper should be 3000 words for BA students and 6000 words for MA students. In either case, it should be written in 12pt font, with 1.5 spacing, 3cm margins on the left and right, and a standard academic typeface (Computer Modern, Palatino, Times New Roman, Calibri, etc.).

## Resources

Questions about the administration of philosophy teaching at LMU should be directed to Thomas Wyrwich ([thomas.wyrwich@lrz.uni-muenchen.de](mailto:thomas.wyrwich@lrz.uni-muenchen.de)). The Erasmus coordinator for philosophy at LMU is Peter

Adamson ([office.peter.adamson@lrz.uni-muenchen.de](mailto:office.peter.adamson@lrz.uni-muenchen.de)). The list of women's representatives (Frauenbeauftragte) for the Philosophy Faculty can be found on the Faculty's webpage (<https://www.philosophie.uni-muenchen.de/fakultaet/frauenbeauftragte/index.html>). Issues regarding the economic, social, and cultural aspects of student life—including studying with a child or studying with a disability—are the responsibility of the Munich Student Union (<https://www.studentenwerk-muenchen.de>).

## Schedule and readings

### 19.10: Introduction and Overview

- No reading

### 26.10: Platonic allegories

- Excerpts from Plato, *The Republic*

### 02.11: How is pure mathematics possible?

- Excerpts from Immanuel Kant, *Prolegomena to Any Future Metaphysics*

### 09.11: An empiricist account of mathematics

- Excerpts from John Stuart Mill, *A System of Logic*

### 16.11: Infinity

- Excerpts from Richard Dedekind, *What are numbers and what should they be?*, and David Hilbert, *On the Infinite*

### 23.11: The Frege–Hilbert controversy

- Patricia A. Blanchette, *Frege and Hilbert on Consistency*

### 30.11: The applicability of mathematics

- Penelope Maddy, *How Applied Mathematics Became Pure*

### 07.12: Diagrams

- James Robert Brown, *Proofs and Pictures*

### 14.12: Explanation

- Alan Baker, *Are there genuine mathematical explanations of physical phenomena?*

### 21.12: NO MEETING

### 28.12: NO MEETING

### 04.01: NO MEETING

### 11.01: Progress

- Excerpts from Imre Lakatos, *Proofs and Refutations*

### 18.01: Fallibilism

- Silvia De Toffoli, *Groundwork for a Fallibilist Account of Mathematics*

### 25.01: Proof and dialogue

- Catarina Dutilh Novaes, *A Dialogical Account of Proofs in Mathematical Practice*

**01.02: Social epistemology**

- Joshua Habgood-Coote and Fenner Stanley Tanswell, Group Knowledge and Mathematical Collaboration: A Philosophical Examination of the *Classification of Finite Simple Groups*

**08.02: Computers and mathematics**

- Gisele Dalva Secco and Luiz Carlos Pereira, Proofs *Versus* Experiments: Wittgensteinian Themes Surrounding the Four-Color Theorem