

Introduction to Philosophy of Mathematics



Christian Wüthrich

Spring 2022

ECTS:	3
Class schedule:	Room A23 (red building)
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What is the nature of mathematical knowledge, as compared to knowledge of the natural world? What, if any, is the connection between the two? What role does mathematics play in empirical sciences such as physics? What role does philosophy play in clarifying the foundations of mathematics? Do abstract objects, such as numbers, exist? Is mathematics somehow true of our world, or is it merely an ingenious language devised by humans to address all sorts of problems?

In this class, we will address these questions and study how leading philosophers and mathematicians have attempted to answer them, giving special attention to the influential schools of logicism, formalism, and intuitionism. No prior college mathematics or philosophy is presupposed, although both will be helpful. Since it offers a focal point for many issues raised in the class, I will give a self-contained introduction to set theory.

Accessibility and Prerequisites. I presuppose the notation of first-order logic with quantifiers. As we will skip some parts of set theory you have already seen in the logic class, I also presuppose the logic course you have taken in the fall semester. As for the mathematics, I hope you can count. Nothing more will be presupposed, and even the counting will be carefully introduced.

Recommended texts

- Stewart Shapiro, *Thinking about Mathematics: The Philosophy of Mathematics*, Oxford University Press, 2000.
- Most readings are available at icorsi at <https://www.icorsi.ch/course/view.php?id=13730>.
- There will be a handout for the material on set theory.

Course requirements and evaluation

The grade for this course will be determined by the points obtained from a single type of evaluation:

1. *Homework* (30 points): There will be **three sets of homework assignments** each worth 10 points due on the following dates:
 - Monday, 21 March 2022

- Monday, 4 April 2022
- Monday, 11 April 2022

Tentative schedule

Readings: for each session, please read the listed readings in advance; the readings with an asterisk are background reading.

Date	Topic and reading assignments	
<i>28 Feb</i>	Introduction: What is philosophy of mathematics? <i>Shapiro, Ch 1</i>	
<i>1 Mar</i>	Introduction continued <i>Shapiro, Ch 2</i>	
<i>2 Mar</i>	History <i>Shapiro, Ch 3 and Ch 4</i>	
<i>7 Mar</i>	Set Theory: Counting all the way to infinity <i>Handout on Set Theory (for all sessions on Set Theory)</i> <i>*Joan Bagaria (2019). Set Theory. Stanford Encyclopedia</i>	
<i>8 Mar</i>	Set Theory: Paradoxes and the foundations of set theory <i>*Andrew D Irvine and Harry Deutsch (2020). Russell's paradox. Stanford Encyclopedia</i>	
<i>9 Mar</i>	Logicism <i>Shapiro, Ch 5</i>	
<i>21 Mar</i>	Formalism <i>Shapiro, Ch 6</i>	Homework 1 due
<i>4 Apr</i>	Transfinite mathematics <i>Moore, Ch 10</i>	Homework 2 due
<i>5 Apr</i>	Intuitionism <i>Shapiro, Ch 7</i>	
<i>11 Apr</i>	Numbers exist <i>Shapiro, Ch 8</i>	Homework 3 due
<i>12 Apr</i>	No they don't <i>Shapiro, Ch 9</i>	
<i>13 Apr</i>	Structuralism <i>Shapiro, Ch 10</i>	