

MATHEMATICS, ITS FOUNDATIONS, AND THEIR IMPLICATIONS

Please note that the seminar language is English! Further reading material on each topic can be provided upon request.

Description:

The first part of the seminar will provide an overview over the foundational theories of the philosophy of mathematics. Starting from Kant's account of the possibility of mathematical knowledge, we will move on to the competing logicist programmes by Frege and Russell, shed some light on Carnapian positivism and Hilbert's formalism, and end with the intuitionist views developed by Brouwer, Heyting and Dummett.

The second part of the seminar is dedicated to four of the most central issues discussed in contemporary philosophy of mathematics: set theory and its ontological implications; mathematical Platonism; its counterpart theory of fictionalism; and, le dernier cri, structuralism.

In the third part of the seminar, we will focus on epistemological questions arising in the context of mathematics, such as the questions of the nature of mathematical truth, its relation to mathematical knowledge, etc. Particular attention will be paid to the concept of self-evidence, its use in mathematical discourse and its different interpretations. The seminar will end by raising the question of the relevance of mathematical self-evidence for other abstract areas of discourse.

Course Room: Humanities Building 2301; **Office Hours:** Mondays 9.30-10.30 in Room 5510.

Course Requirements:

In order to pass this course, participants are expected to

- a. participate in the classes and read/prepare the article under discussion for each week (15% of grade),
- b. prepare short (ca. 5 minutes) presentations of the weekly discussion papers (15% of grade),
- c. write a paper (in English) at the end of the seminar (70% of grade, deadline September 30).

Literature:

ESSENTIALS

1. Kant on mathematical knowledge

Friedman, Michael. 2012, 'Kant on Geometry and Spatial Intuition'. *Synthese* Vol. 186: pp. 231–255.

2. Logicism I: Frege

Frege, Gottlob. 1884. 'The Concept of Number' (Excerpts from *The Foundations of Arithmetic*). Reprinted in: Benacerraf, Paul, and Putnam, Hilary (eds.). 1983. *Philosophy of Mathematics: Selected Readings*. Cambridge: Cambridge University Press: pp. 130-159.

3. Logicism II: Russell

Russell, Bertrand. 1919. 'Selections from *Introduction to Mathematical Philosophy*'. Reprinted in: Benacerraf, Paul, and Putnam, Hilary (eds.). 1983. *Philosophy of Mathematics: Selected Readings*. Cambridge: Cambridge University Press: pp. 160-182.

4. Formalism: Hilbert

Hilbert, David. 1926. 'On the Infinite'. Reprinted in: Benacerraf, Paul, and Putnam, Hilary (eds.). 1983. *Philosophy of Mathematics: Selected Readings*. Cambridge: Cambridge University Press: pp. 183-201.

5. Positivism: Carnap

Carnap, Rudolf. 1956. 'Empiricism, Semantics, and Ontology'. Reprinted in: Benacerraf, Paul, and Putnam, Hilary (eds.). 1983. *Philosophy of Mathematics: Selected Readings*. Cambridge: Cambridge University Press: pp. 241-257.

6. Intuitionism: Brouwer, Heyting, Dummett

Posy, Carl. 2005. 'Intuitionism and Philosophy'. In: Stewart Shapiro (ed.). *The Oxford Handbook of Philosophy of Mathematics and Logic*. Oxford: Oxford University Press: pp. 318-355.

NUMBER THEORY

7. Set Theory

Boolos, George. 1971. 'The Iterative Conception of Set'. Reprinted in: Benacerraf, Paul, and Putnam, Hilary (eds.). 1983. *Philosophy of Mathematics: Selected Readings*. Cambridge: Cambridge University Press: pp. 486-502.

8. Platonism

Parsons, Charles. 1979. 'Mathematical Intuition'. *Proceedings of the Aristotelian Society* Vol. 80: pp. 142-168.

9. Fictionalism

MacBride, Fraser. 1999. Listening to Fictions: A Study of Fieldian Nominalism. *British Journal for the Philosophy of Science* Vol. 50: pp. 431-455.

10. Structuralism

Hellman, Geoffrey. 2005. 'Structuralism'. In: Stewart Shapiro (ed.). *The Oxford Handbook of Philosophy of Mathematics and Logic*. Oxford: Oxford University Press: pp. 536-562.

THE EPISTEMIC STATUS OF MATHEMATICS

11. Mathematical Truth

Benacerraf, Paul. 1973. 'Mathematical Truth'. *The Journal of Philosophy* Vol. 70 No. 19: pp. 661-679.

12. Holism

Shapiro, Stewart. 2011. 'Epistemology of Mathematics: What are the questions? What count as answers?'. *The Philosophical Quarterly* Vol. 61 No. 242: pp. 130-150.

13. Self-evidence

Shapiro, Stewart. 2009. 'We hold these truths to be self-evident: But what do we mean by that?'. *The Review of Symbolic Logic*, Vol. 2 No. 1: pp. 175-207.

14. Mathematics and beyond

Jonas, Silvia (manuscript): What can mathematical self-evidence teach us about religious belief?