PH342-15 Philosophy of Mathematics

24/25

Department
> Philosophy

Level
> Undergraduate Level 3

Module leader
> Benedict Eastaugh

Credit value
> 15

Module duration
> 10 weeks

Assessment
> 20% coursework, 80% exam

Study location
> University of Warwick main campus, Coventry

Description

Introductory description

Do mathematical objects such as numbers and sets exist or are they merely useful fictions? What is the nature of mathematical knowledge and how is it distinct from our knowledge of the physical world? What, if any, is the connection between the two? What role does mathematics play in the empirical sciences? What is the correct logic for reasoning about mathematics? Are formally undecidable statements (e.g. the Parallel Postulate, the Gödel sentence, the Continuum Hypothesis) objectively true or false? This module will explore different ways in which philosophy might be of help in answering these questions, both from the contemporary perspective and that of the major foundational schools of the late 19th and early 20th centuries: logicism, intuitionism, and formalism.

Module aims

This module has two goals: 1) to familiarise students with major developments in the foundations of mathematics from the late 19th century onward; and 2) to illustrate how these developments inform contemporary debates in philosophy of mathematics.

Outline syllabus

This is an indicative module outline only to give an indication of the sort of topics that may be

covered. Actual sessions held may differ.

Week 1: Introduction to the module. Plato and Aristotle.

Week 2: Kant and Mill.

Week 3: Logicism. The class-theoretic paradoxes.

Week 4: The infinite. Cantor and set theory.

Week 5: The axiomatic method.

Week 7: Finitism.

Week 8: Intuitionism.

Week 9: Nominalism and platonism

Week 10: Structuralism.

Learning outcomes

By the end of the module, students should be able to:

- Demonstrate knowledge of some of the central topics in the philosophy of mathematics, and of the historical development of key approaches to the philosophy of mathematics (Subject knowledge and understanding)
- Understand the significance that questions in the philosophy of mathematics have to wider issues in philosophy and the foundations of mathematics (cognitive skills)
- Articulate their own view of the relative merits of different theories and engage critically with the arguments put forward in support of them (key skills)
- Show an understanding of methodological issues in the philosophy of mathematics, and of questions of demarcation between philosophy and mathematics (subject-specific skills)

Indicative reading list

The core textbook for this module will be:

Thinking About Mathematics, by S. Shapiro (Oxford University Press, 2000).

We will also draw on secondary literature from the following two textbooks:

The Infinite (2nd ed.) by A. W. Moore (Routledge, 2001).

The Search for Certainty by M. Giaquinto (Oxford University Press, 2002).

There will also be a substantial use of original sources and recent scholarship. Many important papers can be found in the following collections.

Philosophy of Mathematics: Selected Readings (2nd ed.), edited by P. Benacerraf and H. Putnam (Cambridge University Press, 1983).

From Frege to Gödel: A Source Book in Mathematical Logic, 1879–1931, edited by J. van

Heijenoort.

An excellent handbook in philosophy of mathematics is:

The Oxford Handbook of Philosophy of Mathematics and Logic, edited by S. Shapiro (Oxford University Press, 2005).

Subject specific skills

Show an understanding of methodological issues in the philosophy of mathematics, and of questions of demarcation between philosophy and mathematics.

Transferable skills

Understand how major debates in the philosophy of mathematics—e.g. between logicism, formalism, and intuitionism—are related to topics in the history of philosophy, metaphysics, and epistemology. Appreciate how developments in mathematical logic—e.g. axiomatic set theory, proof theory—grew out of concern for foundational issues in the 19th and early 20th century.

Study

Study time

Type	Required
Lectures	9 sessions of 2 hours (12%)
Seminars	8 sessions of 1 hour (5%)
Private study	124 hours (83%)
Total	150 hours

Private study description

No private study requirements defined for this module.

Costs

No further costs have been identified for this module.

Assessment

You do not need to pass all assessment components to pass the module.

Students can register for this module without taking any assessment.

Assessment group DB

	Weighting	Study time
1000 word essay	20%	
Online Examination	80%	
2 hour exam		

~Platforms - AEP

- Online examination: No Answerbook required

Feedback on assessment

Written feedback on essays and exams.

[Past exam papers for PH342](#)

Availability

Pre-requisites

The module is designed to be as self-contained as possible. However, you should be aware that several of the topics we will discuss are related to developments in mathematical logic (as treated in modules like PH210 Logic 2, PH340 Logic 3 and MA3H3 Set Theory), and also build on philosophical themes which are covered in modules like PH251 Metaphysics, PH252 Epistemology, and PH144 Mind and Reality. Background in these subjects will therefore be helpful for fully engaging with the module content.

To take this module, you must have passed:

- All of

  - [PH136-15 Logic 1: Introduction to Symbolic Logic](#)

Courses

This module is Core optional for:

- UMAA-GV17 Undergraduate Mathematics and Philosophy
  - Year 3 of GV17 Mathematics and Philosophy
  - Year 3 of GV17 Mathematics and Philosophy
  - Year 3 of GV17 Mathematics and Philosophy
- UMAA-GV18 Undergraduate Mathematics and Philosophy with Intercalated Year

- ○ Year 4 of GV18 Mathematics and Philosophy with Intercalated Year
- ○ Year 4 of GV18 Mathematics and Philosophy with Intercalated Year

This module is Optional for:

- UPHA-VL78 BA in Philosophy with Psychology
  - ○ Year 2 of VL78 Philosophy with Psychology
  - ○ Year 3 of VL78 Philosophy with Psychology
  - ○ Year 3 of VL78 Philosophy with Psychology
- UHIA-V1V5 Undergraduate History and Philosophy
  - ○ Year 2 of V1V5 History and Philosophy
  - ○ Year 3 of V1V5 History and Philosophy
- Year 4 of UHIA-V1V6 Undergraduate History and Philosophy (with Year Abroad)
- UMAA-G100 Undergraduate Mathematics (BSc)
  - ○ Year 3 of G100 Mathematics
  - ○ Year 3 of G100 Mathematics
  - ○ Year 3 of G100 Mathematics
- UMAA-G103 Undergraduate Mathematics (MMath)
  - ○ Year 3 of G100 Mathematics
  - ○ Year 4 of G103 Mathematics (MMath)
  - ○ Year 4 of G103 Mathematics (MMath)
- UMAA-GV17 Undergraduate Mathematics and Philosophy
  - ○ Year 2 of GV17 Mathematics and Philosophy
  - ○ Year 2 of GV17 Mathematics and Philosophy
  - ○ Year 2 of GV17 Mathematics and Philosophy
- UMAA-GV19 Undergraduate Mathematics and Philosophy with Specialism in Logic and Foundations
  - ○ Year 2 of GV19 Mathematics and Philosophy with Specialism in Logic and Foundations
  - ○ Year 3 of GV19 Mathematics and Philosophy with Specialism in Logic and Foundations
  - ○ Year 4 of GV19 Mathematics and Philosophy with Specialism in Logic and Foundations
- UPHA-V700 Undergraduate Philosophy
  - ○ Year 2 of V700 Philosophy
  - ○ Year 2 of V700 Philosophy
  - ○ Year 3 of V700 Philosophy
  - ○ Year 3 of V700 Philosophy
  - ○ Year 3 of V700 Philosophy
  - ○ Year 3 of V700 Philosophy
- Year 4 of UPHA-V701 Undergraduate Philosophy (wiith Intercalated year)
- UIPA-V5L8 Undergraduate Philosophy and Global Sustainable Development
  - ○ Year 2 of V5L8 Philosophy and Global Sustainable Development
  - ○ Year 2 of V5L8 Philosophy and Global Sustainable Development
  - ○ Year 3 of V5L8 Philosophy and Global Sustainable Development
  - ○ Year 3 of V5L8 Philosophy and Global Sustainable Development
- Year 4 of UIPA-V5L9 Undergraduate Philosophy and Global Sustainable Development (with Intercalated Year)
- UPHA-VQ72 Undergraduate Philosophy and Literature
  - ○ Year 2 of VQ72 Philosophy and Literature

- ○ Year 3 of VQ72 Philosophy and Literature
- Year 4 of UPHA-VQ74 Undergraduate Philosophy and Literature (with Work Placement)
- Year 4 of UPHA-VQ73 Undergraduate Philosophy and Literature with Intercalated Year
- Year 4 of UPHA-VL80 Undergraduate Philosophy with Psychology (with Work Placement)
- UPHA-VQ52 Undergraduate Philosophy, Literature and Classics
  - ○ Year 2 of VQ52 Philosophy, Literature and Classics
  - ○ Year 3 of VQ52 Philosophy, Literature and Classics
- Year 4 of UPHA-VQ53 Undergraduate Philosophy, Literature and Classics (with Work Placement)
- UPHA-V7ML Undergraduate Philosophy, Politics and Economics
  - ○ Year 2 of V7MR Philosophy, Politics and Economics (Bipartite with Economics Major)
  - ○ Year 2 of V7MR Philosophy, Politics and Economics (Bipartite with Economics Major)
  - ○ Year 2 of V7MP Philosophy, Politics and Economics (Bipartite)
  - ○ Year 2 of V7MP Philosophy, Politics and Economics (Bipartite)
  - ○ Year 2 of V7MP Philosophy, Politics and Economics (Bipartite)
  - ○ Year 2 of V7MP Philosophy, Politics and Economics (Bipartite)
  - ○ Year 2 of V7ML Philosophy, Politics and Economics (Tripartite)
  - ○ Year 2 of V7ML Philosophy, Politics and Economics (Tripartite)
  - ○ Year 2 of V7ML Philosophy, Politics and Economics (Tripartite)
  - ○ Year 3 of V7MR Philosophy, Politics and Economics (Bipartite with Economics Major)
  - ○ Year 3 of V7MR Philosophy, Politics and Economics (Bipartite with Economics Major)
  - ○ Year 3 of V7MP Philosophy, Politics and Economics (Bipartite)
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  - ○ Year 3 of V7MP Philosophy, Politics and Economics (Bipartite)
  - ○ Year 3 of V7ML Philosophy, Politics and Economics (Tripartite)
  - ○ Year 3 of V7ML Philosophy, Politics and Economics (Tripartite)
  - ○ Year 3 of V7ML Philosophy, Politics and Economics (Tripartite)
- UPHA-V7MM Undergraduate Philosophy, Politics and Economics (with Intercalated year)
  - ○ Year 4 of V7MS Philosophy, Politics and Economics (Bipartite with Economics Major) (with Intercalated Year)
  - ○ Year 4 of V7MS Philosophy, Politics and Economics (Bipartite with Economics Major) (with Intercalated Year)
  - ○ Year 4 of V7MS Philosophy, Politics and Economics (Bipartite with Economics Major) (with Intercalated Year)
  - ○ Year 4 of V7MS Philosophy, Politics and Economics (Bipartite with Economics Major) (with Intercalated Year)
  - ○ Year 4 of V7MQ Philosophy, Politics and Economics (Bipartite) with Intercalated Year
  - ○ Year 4 of V7MQ Philosophy, Politics and Economics (Bipartite) with Intercalated Year
  - ○ Year 4 of V7MM Philosophy, Politics and Economics (Tripartite) (with Intercalated year)
  - ○ Year 4 of V7MH Philosophy, Politics and Economics - Economics/Philosophy Bipartite (Economics Major) (with Intercalated year)
  - ○ Year 4 of V7MF Philosophy, Politics and Economics - Economics/Politics Bipartite (Economics Major) (with Intercalated year)
  - ○ Year 4 of V7MI Philosophy, Politics and Economics - Philosophy/Economics Bipartite (Philosophy Major) (with Intercalated year)

- ○ Year 4 of V7MJ Philosophy, Politics and Economics - Philosophy/Politics Bipartite (with Intercalated year)
  - ○ Year 4 of V7MG Philosophy, Politics and Economics - Politics/Economics Bipartite (Politics Major) (with Intercalated year)
- UPHA-V7MW Undergraduate Politics, Philosophy and Law
  - ○ Year 2 of V7MW Politics, Philosophy and Law
  - ○ Year 2 of V7MW Politics, Philosophy and Law
  - ○ Year 3 of V7MW Politics, Philosophy and Law
  - ○ Year 3 of V7MW Politics, Philosophy and Law