124 Philosophy of Mathematics

Christian Wüthrich   Winter 2012

Class schedule:	TuTh 11:00-12:20, WLH 2209
Website:	http://philosophy.ucsd.edu/faculty/wuthrich/
Contact:	Office hours are Th 3-4:50pm, and by appointment
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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.

Prerequisites: Upper-division standing or permission of instructor. Informally, I will also presuppose the notation of first-order logic with quantifiers. If you ever took a logic class, you've seen this; if not, don't worry: I expect anyone who dares to sign up for a class on the philosophy of mathematics to pick this up quickly.

Required texts

- Stewart Shapiro, *Thinking about Mathematics: The Philosophy of Mathematics*, Oxford University Press, 2000.

- The are two additional sources for readings in this class: the *Stanford Encyclopedia of Philosophy* (SEP) and e-reserves. Links to both are available on the course web page.

- I plan to produce a handout for the material on set theory, which of course must be read.

Course requirements and evaluation

The grade for this course will be determined by the total points a student earns from the three types of evaluation indicated below. I grade to the curve, i.e., the top 25-30% of the students in this class (including all who take it for a letter grade or a P/NP, but not including the withdrawals W) will get a grade in the A range (A+, A, A-), the next 25-35% a grade in the B range (B+, B, B-), the next 25-30% a grade in the C range (C+, C, C-), and the

remaining 5-25% a D or an F. This is the minimum I guarantee; if the class has worked very well and no one deserves a D or an F, I will adjust the curve upwards, accordingly.

1. *Midterm exam* (30 points): There will be a **midterm exam** on 7 February 2012. The midterm exam will test all material covered up to the day it is held, with a special emphasis on set theory.

2. *Paper* (30 points) [`http://www.turnitin.com`]: There will be a **take-home midterm paper** due on 1 March 2012. I shall hand out a list of paper topics fairly early in the course. For each day your paper is late, five points will be deducted from your point total, although no negative point totals will be given.

3. *Final exam* (40 points): There will be a **final exam** on TBD, in a location to be announced. You are not allowed to use any books or notes or the like, i.e. the exam is 'closed-books'. The final exam is cumulative, i.e. it covers all the material of the entire course.

The midterm paper must be submitted through `http://www.turnitin.com` *by the due date* in order to earn credit. You must enroll at `http://www.turnitin.com` by creating a new profile. You will need the following course information:

Class ID: 4524544
Enrollment Password: phil124wi12

Note the difference between lower case 'l' and the number '1'. If you have any problems with using `http://www.turnitin.com`, you can contact the Instructional Web Development Center of Academic Computing Services at 858-822-3315 or iwdc@ucsd.edu.

The fine print

Students agree that by taking this course all required papers will be subject to submission for textual similarity review to Turnitin.com for the detection of plagiarism. All submitted papers will be included as source documents in the Turnitin.com reference database solely for the purpose of detecting plagiarism of such papers. Use of the Turnitin.com service is subject to the terms of use agreement posted on the Turnitin.com site.

You must observe the University's Policy on Integrity of Scholarship, which can be found at `http://senate.ucsd.edu/AcademicIntegrity/AcademicIntegrity.htm`.

Make-up exams will only be given under the most severe circumstances. The student who wishes to write a make-up exam must inform me (by phone or email) ahead of the time of when the exam is due (papers) or takes place (in-class exams). In order to qualify for a make-up exam, appropriate evidence of the most severe circumstances must be produced by the student. I will determine, in consultation with the student, what qualifies as appropriate evidence.

Tentative schedule

Final Exam: Thursday, 22 March 2012, 11:30am-2:29pm

Date	Topic and reading assignments
10 Jan	Introduction: What is philosophy of mathematics?
12 Jan	Introduction continued *Shapiro, Ch 1 and Ch 2*
17 Jan	Antiquity: Plato and Aristotle *Shapiro, Ch 3*
19 Jan	Modernity: Kant and Mill *Shapiro, Ch 4*
24 Jan	Set theory *Thomas Jech, 'Set theory', SEP* *Handout on set theory (for all sessions on set theory)*
26 Jan	Set theory continued
31 Jan	Set theory continued
2 Feb	Set theory continued *A D Irvine, 'Russell's paradox', SEP*
7 Feb	**Midterm**
9 Feb	Logicism *Shapiro, Ch 5*
14 Feb	Logicism continued *Demopoulos and Clark, 'The Logicism of Frege, Dedekind, and Russell'* (selections, see website)
16 Feb	Formalism *Shapiro, Ch 6*
21 Feb	Formalism continued *Detlefsen, 'Formalism'* (selections, see website)
23 Feb	Intuitionism *Shapiro, Ch 7*
28 Feb	Intuitionism continued *Posey, 'Intuitionism and philosophy'*
1 Mar	Numbers exist **(Paper due)** *Shapiro, Ch 8*
6 Mar	No, they don't *Shapiro, Ch 9*
8 Mar	Structuralism *Shapiro, Ch 10*
13 Mar	Structuralism continued *Resnik, 'Mathematics as a science of patterns: ontology and reference'* *Resnik, 'Mathematics as a science of patterns: epistemology'*
15 Mar	Wrapping the term up