Phil/Math 375: Philosophy of Mathematics Syllabus

Instructor: Dr. Audrey Yap (`ayap@uvic.ca`)
Office/Phone: CLE B307 (721-7510)
Office Hours: Tue 11:30 - 12:30, Thu 10:30 -11:30, and by appointment
Class Information: TWF 1:30-2:20 in CLE A308
Course Website: Through CourseSpaces.
Prerequisites: One of Phil 203, 370, Math 122 or 360.
Textbook: Alexander George and Daniel Velleman, *Philosophies of Mathematics*,
Some additional readings online.

Course Objectives:

The goal of this course is to give students a technical introduction to current problems in the Philosophy of Mathematics, by looking at the mathematical developments which led to those problems. The importance of certain logical results which affected views about the nature of mathematics will also be emphasized. Even though this is not a logic course, an understanding of certain results will be required, as well as the impact of those results on philosophy.

Communication: Office hours are held on a drop-in basis. If you want to schedule an appointment outside my office hours, try emailing me with a few suggestions for times that would work for you. If you ask me a question over email, you can expect a reply within about 1 working day. If you don't hear back from me after that time frame, feel free to try again in case your message went astray. Email is the best way to get in touch with me. If you do email me, please make sure that I can tell from the email what your name is.

Coursework:

You must complete seven assignments over the course of the semester, each worth 10% of the final grade. Assignments will be posted roughly every other week, and will be due in class on the specified due date. Most assignments will have a writing assignment option and a problem set option, and you can choose which one of these you prefer. However, of the assignments you do, at least one must be a writing assignment and one must be a problem set. You may have a three day extension on one of these assignments without documentation, simply by requesting it by email before the assignment is due. Assuming the assignment is due on a Friday, your new due date will be Monday. Further requests for extensions will need to be backed up with documentation. A final paper worth 30% will be assigned at the end of the semester, due after classes are over.

Exceptions to these rules will only be made in the case of extenuating circumstances which interfere with the timely completion of the assigned work. Such documentation must

be received within a week of the due date. Plagiarised work will not be given credit. For more information on plagiarism, see the University Calendar.

Numerical and Letter Grades: Grades will be given as percentile marks. The percentile mark for the course will be converted to a letter grade in the following manner: A+ = 90 - 100, A = 85 - 89, A- = 80 - 84, B+ = 77 - 79, B = 73 - 76, B- = 70 - 72, C+ = 65 - 69, C = 60 - 64, D = 50 - 59, F = 0 - 49. The A range means exceptional, outstanding and excellent performance. A grade in the B range means a very good, good and solid performance. A grade in the C+ or C range means satisfactory, or minimally satisfactory, performance. A grade of D or D- indicates merely passable or marginal performance. An F indicates unsatisfactory performance.

Schedule of Readings

- Week One: Jan 4, 6

  Topic: Introduction to the Philosophy of Mathematics.
  Reading: George and Velleman, Introduction.

- Week Two: Jan 10, 11, 13

  Topic: Frege's Logicism.
  Reading: George and Velleman, Chapter 2.
  Gottlob Frege, excerpts from *The Foundations of Arithmetic*.

- Week Three: Jan 17, 18, 20

  Topic: Frege's Logicism.
  Reading: George and Velleman, Chapter 2.
  Gottlob Frege, excerpts from *The Foundations of Arithmetic*.
  Bertrand Russell, "Letter to Frege"
  HW1 due Jan 20

- Week Four: Jan 24, 25, 27

  Topic: Set Theory.
  Reading: George and Velleman, Chapter 3 (44-59, 81-85)
  HW2 due Jan 27

- Week Five: Jan 31, Feb 1, 3

  Topic: Set Theory and the Continuum Hypothesis.
  Reading: Penelope Maddy, "Some Naturalistic Reflections on Set-Theoretic Method"
  Kurt Gödel, "What is Cantor's Continuum Problem?"
  HW3 due Feb 3

- Week Six: Feb 7, 8, 10

Topic: Developing the Natural Numbers
Reading: George and Velleman, Chapter 3 (59-81)
Paul Benacerraf, "What Numbers Could Not Be"

- Week Seven: Feb 21, 22, 24

  Topic: Intuitionism
  Reading: George and Velleman, Chapter 4
  Rosalie Iemhoff, "Intuitionism in the Philosophy of Mathematics"
  HW4 due Feb 24th

- Week Eight: Feb 28, Mar 1, 3

  Topic: Intuitionism in Mathematics
  Reading: George and Velleman, Chapter 5
  HW5 due Mar 3

- Week Nine: Mar 7, 8, 10

  Topic: Hilbert's Program Reading: George and Velleman, Chapter 6
  David Hilbert, "Mathematical Problems," (introduction and first two problems)
  Patricia Blanchette, "Frege and Hilbert on Consistency"

- Week Ten: Mar 14, 15, 17

  Topic: Gödel's First Incompleteness Theorem
  Reading: George and Velleman, Chapter 7
  HW6 due Mar 17

- Week Eleven: Mar 21, 22, 24

  Topic: Gödel's Second Incompleteness Theorem.
  Reading: George and Velleman, Chapter 7
  HW7 due Mar 24

- Week Twelve: Mar 28, 29, 31 Topic: Philosophical Implications of Incompleteness.
  Reading: Kurt Gödel, "Some basic theorems on the foundations of mathematics and
  their implications"
  Stewart Shapiro, "Incompleteness, Mechanism, and Optimism"
  Office Hours/Paper Consultation Apr 4
  Final Project/Paper due Apr 7

Note: This syllabus is tentative, and should only be used to give a rough guide to
the course schedule. Additional readings may be assigned, and dates may be changed if
necessary.