Syllabus, Seminar: Philosophy of Mathematics, SPRING, 2014

Catalog Description: Seminar in Philosophy. Philosophy seminars take up special topics and issues in philosophy as well as in-depth studies of prominent and influential philosophers. Prerequisite: Phi 101 or permission from the instructor. Three units.

Faculty: Dr. Don Petcher, Ph.D., Professor of Physics

Textbooks: Thinking about mathematics, by Stewart Shapiro; New Directions in the Philosophy of Mathematics, Thomas Tymoczko, ed.; Mathematics in a Postmodern Age, Russell W. Howell and W. James Bradley, eds.

I. Course Objectives

Upon completion of the course, the student will be expected to be able to

A. To familiarize students with the principle schools of thought concerning mathematics, both prior to and following the “crisis” in mathematics of the late 19th century.

B. To familiarize students with current trends in the philosophy of mathematics including Gödel’s theorems and their aftermath, and the relation of mathematics to the empirical sciences.

C. To increase students’ ability to analyze philosophical texts and arguments and to engage in clear, insightful and charitable debate about the merits of philosophical theses.

D. To develop students’ appreciation for the complexity of the issues in the philosophy of mathematics.

E. To develop students’ understanding of how theological themes may affect one’s thinking about the philosophy of mathematics.

II. Methods

A. Readings: Focused assignment readings of primary and secondary texts.

B. Class Sessions: Lecture and discussion, including regularly attending philosophy (Davis) and math (Park) professors.

C. Quizzes: In class quizzes on readings and previous lectures.

D. Written assignments: Critical essays on readings, and responses to others’ written assignments.

E. Presentations: Student presented papers and presentations teaching content of readings.

III. Means of Assessment

A. Critical Analysis Paper. This addresses objectives C–D.

   (a) Analysis (15%).

   (b) Response to Analysis (10%).

B. Quiz Average (20%). This addresses objective A–E.

C. Journal Paper OR Review Paper. This addresses objectives B–E.

   (a) Journal Paper breakdown.

      i. Prospectus (5%).

      ii. Rough Draft (10%).
iii. Final Draft (15%).

(a) Book Review breakdown. This addresses objectives B–E.
   i. Proposal (5%).
   ii. Review Summary (5%).
   iii. Rough Draft (10%).
   iv. Final Draft (10%).

D. Teaching Assignment OR Final Exam (25%).

(a) Teaching Assignment. This addresses objectives B–E.

(b) Final Exam. This addresses objectives A–E.
Information and Policy Sheet
Seminar: Philosophy of Mathematics, PHI 405

Location: Mills Hall 310

Time: MWF, 1:00 PM

Course Summary: This course will address the general area of the philosophy of mathematics. We will start with some historical background, and then study the “crisis” in the philosophy of mathematics of the late nineteenth century followed by studies of the three major schools of thought which emerged in the “foundationalist” approach to this subject. Next we will investigate more recent criticism of the foundational approaches and look at some of the new emerging suggestions and proposals for going forward in the field. Finally we will consider various Christian voices on the subject and questions that arise in that context.

Final Exam: Short answer and essay questions, Wednesday, May 7, 2:00–4:00 PM. (Note that the final is not required if the stages of the Book Review or Journal Paper are completed.)

Written Assignment #1: (to be handed in electronically)
Critical Analysis: A 3–4 page (1200 word) response to one or more of the principle claims made in any one of the first 5 essays in Tymoczko or chapter 10 of Shapiro (at most two persons per paper, you may make requests). The paper is due two weeks prior to the day the reading is assigned in class (two class periods grace). Please send your requests by email in the first week. Topics will be assigned the following week. Some (probably all) of these papers will be read in class.

Response to a Critical Analysis: A 2–3 page (1000 word) response to a Critical Analysis paper. Due electronically by midnight two days before the day for the reading being analyzed to be discussed (NO GRACE).

Written Assignment #2: Missing any deadline will result in a high grade of B+ for that part of the assignment; after one class time, the grade may decrease by up to one increment (B+ to B, etc.) for each class day the assignment is late.

Journal Paper: A 6–7 page (1800 word) argument in support of a thesis that relates to one of the assigned readings, and engages at least three other articles or books published within the last couple decades. A prospectus is due Feb. 6 (with four days grace), identifying the articles or books that will serve as the focus for the discussion and a sketch of the thesis to be pursued. A rough draft is due Mar. 20 (with four days grace), and the final draft is due at the time of the final exam, May 7, 2:00 PM (no grace). Note: if any of the deadlines are not met for completing this assignment, the final will be required.

OR

Book Review: A 6–7 page (1800 word) review of a fairly recent important (e.g. mainstream philosopher) title (150 page, minimum, or two related works by the same author totaling at least that amount) bearing directly some feature of the Philosophy of Mathematics. The review should summarize the principal claims advanced, and explain the significance the work should have for Christian thinking about mathematics. Works that have been assigned for other courses at Covenant in the past year may not be reviewed. No work may be reviewed by more than one student in the class (first come, first served). The proposal is due Feb. 6 (with four days grace – but come earlier to reserve your book) that identifies the work to be reviewed and explains (in one paragraph) why the work merits consideration. The proposal will also identify sources for two scholarly reviews of the work. A review summary of at least two other reviews of the book is due Feb. 20 (two days grace), a rough draft is due Mar. 20 (with four days grace), and the final draft is due at the time of the final exam, May 7, 2:00 PM (no grace).
Quizzes: Many classes for which readings are assigned will begin with a brief quiz. At least one question will concern the assigned reading for that day; at least one other will concern the class lectures and discussion since the last quiz. The lowest two quiz grades will be dropped.

Teaching Assignment:
Each student will choose a chapter among the ones not specifically assigned in Tymoczko or Howell & Bradley (subject to approval of the professor - one person per chapter) to prepare and to present to us in the latter part of the semester. More information later. (OR Final Exam)

Office Hours: Generally you are welcome to stop by anytime I am in my office. Designated office hours will be announced on my office door and on the physics web site. Also by appointment.

Physics Web Site: The physics web site is http://physics.covenant.edu/. You will find a link to the course web page there, which will have a link to this syllabus and other information related to the course.

For Further Reference:
Standard Anthologies

Other References
Penelope Maddy, 1990: Realism in Mathematics, Oxford University Press.
Penelope Maddy, 2000: Naturalism in Mathematics, Oxford University Press.
Mark Balaguer, 2001: Platonism and Anti-Platonism in Mathematics, Oxford University Press.
Vladimir Tasić, 2001: Mathematics and the Roots of Postmodern Thought, Oxford University Press.
Marcus Giaquinto, 2005: The Search for Certainty, Oxford University Press.
Torkel Franzén, 2005: Gődel’s Theorem: An Incomplete Guide to it’s Use and Abuse, A K Peters/CRC
Press.


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<tr>
<th>Date</th>
<th>Reading</th>
<th>Topic</th>
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<tr>
<td>Jan. 14</td>
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<td>Introduction to the course/ an exercise</td>
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<td>Jan. 16</td>
<td>Shapiro chapter 1 and 2</td>
<td>Classical Philosophy of Mathematics Taxonomy</td>
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<td>Jan. 21</td>
<td>Shapiro chapter 3</td>
<td>Reflections on Greek Philosophy</td>
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<td>Jan. 23</td>
<td>Howell and Bradley chapter 5</td>
<td>Pre-modern mathematical attitudes</td>
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<td>Jan. 28</td>
<td>Howell and Bradley chapter 2</td>
<td>A story about $\infty$, a problem for Platonism? Cultural pre-modern attitudes</td>
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<td>Feb. 4</td>
<td>Shapiro chapter 4</td>
<td>Kant and Mathematics, Modern Geometry as background for the crisis</td>
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<td>Feb. 6</td>
<td>Shapiro chapter 5</td>
<td>Logicism</td>
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<td>Feb. 11</td>
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<td>DAY OF PRAYER</td>
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<td>Feb. 13</td>
<td>Shapiro chapter 6</td>
<td>Formalism</td>
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<td>Feb. 18</td>
<td>Shapiro chapter 7</td>
<td>p-q systems</td>
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<tr>
<td>Feb. 20</td>
<td>Howell and Bradley chapter 6</td>
<td>Symbolic logic</td>
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<td>Feb. 25</td>
<td>Shapiro chapter 8</td>
<td>Gödel numbers and Gödel's proof</td>
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<td>Feb. 27</td>
<td>Shapiro chapter 9</td>
<td>Gödel's Theorem continued</td>
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<td>Mar. 4</td>
<td>Hersh article</td>
<td>Tymoczko student presentations</td>
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<td>Mar. 6</td>
<td>Lakatos article</td>
<td>Tymoczko student presentations</td>
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<td>Mar. 8–16</td>
<td>SPRING BREAK</td>
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<td>Mar. 18</td>
<td>Putnam article</td>
<td>Tymoczko student presentations</td>
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<td>Mar. 25</td>
<td>Goodman article</td>
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<td>Mar. 27</td>
<td>Shapiro student presentations</td>
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Tentative Schedule (last updated February 6, 2014)
**Reading:** Shapiro chapter 10

The remainder of semester is to be worked out with students, depending on your suggestions for topics and your choices for your own teaching.

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<th>Tuesday</th>
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<td>Apr. 29</td>
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**Assessment Day (no class)**

**Summary and wrap up**

**Reading/Snow Day**

**Final Exam:** 2:00 PM – 4:00 PM