Phil 616 Philosophy of Science Winter Term 2006

Syllabus and Readings
Professor: Jamie Tappenden 2228 Angell Hall
Email: tappen@umich.edu
Time: 4:00 - 6:00
Room: 1141 Angell Hall

Requirements: A seminar presentation and a final paper (ideally the long paper is expanded from the presentation, though this is negotiable)

A webpage for posting additional materials, discussion topics etc. is at: http://www-personal.umich.edu/~tappen/Phil616.htm

Many of the readings in the first half of the course will come from the collection: Philosophy of Mathematics: Selected readings (2nd. ed.) edited by Hilary Putnam and Paul Benacerraf
The introductory essay by Benacerraf is really superb and should be read.

You should also get, if you don’t already have it, Frege’s Grundlagen der Arithmetik. You can probably find a used copy in most used bookstores or online.

Readings Marked Tanner will be on reserve in the Tanner philosophy library, 1171 Angell Hall.
Readings Marked Jstor are available on JSTOR.

A book with generic orientation for those without a lot of background is D. Vellmann and A. George: Philosophies of Mathematics

The readings have been chosen so they don’t make significant technical demands on the reader, but occasionally technical material couldn’t be avoided. I’ve indicated below which of the articles I think will pose challenges in this regard.
Weekly readings

Jan. 9
Introductory overview lecture (no readings)

Jan. 16
MLK day (no readings)

Part A - standard

Jan. 23
Logicism
Carnap, Rudolph The logicist foundations of mathematics, Symposium on the Foundations of Mathematics, Erkenntnis (1931), in Benacerraf and Putnam


Ayer, A.J. Selections from Language, Truth, and Logic in Benacerraf and Putnam
G. Frege Foundations of Arithmetic

A. Coffa “Kant, Bolzano and the Emergence of Logicism” Journal of Philosophy Jstor

Jan. 30, Feb. 6
Platonism and the existence of abstract entities; neologicism

K. Godel “What is Cantor’s Continuum Problem?” Benacerraf and Putnam; Jstor

P. Benacerraf “Mathematical Truth” In Benacerraf and Putnam (also jstor

Gideon Rosen “Abstract Objects”
http://plato.stanford.edu/entries/abstract-objects/

Mark Colyvan on indispensibility
http://plato.stanford.edu/entries/mathphil-indis/

Mark Balaguer “Platonism in Metaphysics”
http://plato.stanford.edu/entries/platonism/

C. Wright and B. Hale ”Logicism in the Twenty-first Century” in Shapiro, (ed.) The Oxford Handbook of Philosophy of Logic and Mathematics Tanner
Feb. 13, Feb. 20

Finitism, Formalism, the Hilbert Program, the Friedman Program, and the Gödel Theorems


Reread Benacerraf “Mathematical Truth”

H. Curry “Remarks on the Definition and Nature of Mathematics” in Benacerraf and Putnam

W. Tait “Finitism” *Journal of Philosophy* 1981 *Jstor*  
(Some parts of this presuppose some technical details)

Richard Zach “Hilbert’s Program” online at the Stanford Encyclopedia  
http://plato.stanford.edu/entries/hilbert-program/

One paper that is really quite interesting, but sometimes technically demanding, is:  
G. Kreisel “Hilbert’s Programme” in Benacerraf and Putnam  
In addition to the technical demands, another problem (often a problem with Kreisel papers) is that he jumps from topic to topic so quickly, and makes his claims in such a compact and gnomic way, that it is hard to figure out what he is saying about any particular point. But despite these obstacles, there are many exceedingly penetrating and unusual observations scattered throughout (often a strength of Kreisel papers). So it’s worth skimming through, though you should just skim it. Don’t get bogged down on specific points - try to let it spark new ideas for you.

Two papers that require significant logic background in places:  
W. Sieg “Sixty Years of Hilbert’s Program” *Journal of Symbolic Logic* 1988 *Jstor*  
S. Simpson “Partial Realizations of Hilbert’s Program” *Journal of Symbolic Logic* 1988 *Jstor*  

I’ll present a sketch of the Gödel theorems and some discussion of their relevance. There is no specific reading here, but for people seeking background, a useful resource online is Peter Smith’s draft book on the Gödel theorems at: Gödel theorems. This doesn’t presuppose a lot of facts of any background logic, but it does presuppose the kind of facility with technical detail that is sometimes described as “mathematical maturity”. A really excellent presentation of the theorem for everyone, including the mathematically immature, is:

T. Franzén *Gödel’s Theorem. An Incomplete Guide to its Use and Abuse*  

Feb. 20 ***************** Spring Break *****************
Mar. 6
Intuitionism and Constructive mathematics

M. Dummett “The Philosophical Basis of Intuitionistic Logic” in Benacerraf and Putnam

A. Heyting “The Intuitionist Foundations of Mathematics” in Benacerraf and Putnam

L. Brouwer “Intuitionism and Formalism” in Benacerraf and Putnam

L. Brouwer “Consciousness, Philosophy and Mathematics” in Benacerraf and Putnam

Douglas Bridges “Constructive Mathematics”
http://plato.stanford.edu/entries/mathematics-constructive/

Mar. 13
The Concept of Set and the Concept of Category; Structure and Structuralism

I’ll discuss “structuralism” with a focus on the core historical case of Dedekind:

G. Boolos “The Iterative Conception of Set” in Benacerraf and Putnam

Jstor

R. Dedekind: *The Nature and Meaning of Numbers* Tanner


J. Avigad: “Methodology and Metaphysics in Dedekind’s Theory of Ideals” Online At: http://www.andrew.cmu.edu/user/avigad/Papers/dedekind.pdf

Part B - new wave

Mar. 20
Visualization and Diagrammatic reasoning

J. Tappenden “Proofstyle and Understanding in Mathematics I” Online at: http://www-personal.umich.edu/ tappen/Proofstyle.pdf


Marcus Giaquinto “Epistemology of visual thinking in elementary real analysis”, *Brit. J.*
M. Giaquinto “From Symmetry Perception to Basic Geometry” in P. Mancosu, K.P. Jørgensen and S.A. Pedersen (eds.) Visualization, Explanation and Reasoning Styles in Mathematics


Mar. 27
The Riemann Revolution and “Fruitfulness” as a guide to mathematical concept-choice


J. Tappenden “The Caesar Problem in its Historical Context: Mathematical Background” Dialectica 2005

J. Tappenden “The Riemannian Background to Frege’s Philosophy” forthcoming in J. Gray and J. Ferreiros

J. Tappenden “Real Definition Revisited: The Riemann-Dedekind Theory of Fruitful Concepts”

[Plus I will distribute a survey paper on “fruitful concepts” I had better have finished by March 30 or face a wrathful Paolo Mancosu]

Apr. 3
Mathematical Explanation


Alan Baker: “Are there Genuine Mathematical Explanations of Physical Phenomena?” Mind 2005
“Reflections on Mathematical Explanation (Why do Elliptic Functions have Two Periods?) manuscript

Apr. 10
Plausible reasoning in mathematics
J. Tappenden “Abbe, Frege and Plausible Reasoning in Mathematics” manuscript

D. Corfield chapter 5 and 6 of *Toward a Philosophy of Real Mathematics* Tanner


Apr. 17
Applied mathematics and Pen Maddy’s “Naturalism”
(Note: The time and place of this seminar will be adjusted to make it possible for Maddy to attend)

“Three forms of Naturalism” and “Second Philosophy” available at: http://www.lps.uci.edu/home/fac-staff/faculty/maddy/