LOGIC SEMINAR
***Spring* 2009**

Thursday, April 23, 2009
5:15–6:15 p.m.
Speaker: Kai Maeda
Place: Monroe Hall (2115 G Street), Room 267
Title: *Ordered Groups, Conradian Groups, and Spaces of Orders*

Thursday, April 16, 2009
5:15–6:15 p.m.
Speaker: Nate Ackerman, University of Pennsylvania
http://www.math.upenn.edu/~nate/
Place: Monroe Hall (2115 G Street), Room 267
Title: *Trees, Sheaves and Definition by Recursion*

Abstract: We will show there is a topological space for which presheaves are the same thing as trees. We will further show that there is a sheaf on this topological space which has an important relationship with Baire space.

We will then use these connections to show how a definition by transfinite recursion can be thought of as an operation on sheaves, and how the well-definedness of such a definition can be through of as a property of the sheaf we are working on.

This will then allow us to define a second order tree as a sheaf on a tree and to expand our notion of definition by recursion to all well-founded second order trees (even those which are ill-founded as normal trees). We will then mention how these techniques can be used to prove a variant of the Suslin-Kleene Separation theorem.

Thursday, April 9, 2009
5:15–6:15 p.m.
Speaker: Ali Enayat, American University
http://academic2.american.edu/~enayat/
Place: Monroe Hall (2115 G Street), Room 267
Title: *Finite set theories, Part II*

Thursday, March 26, 2009
5:15–6:15 p.m.
Speaker: Ali Enayat, American University
http://academic2.american.edu/~enayat/
Place: Monroe Hall (2115 G Street), Room 267
Title: *Finite set theories*
Abstract: For the purposes of this talk, a "finite set theory" is any axiomatic system of set theory that includes the axiom "every set is finite." For example, the theory *ZF_fin* obtained from Zermelo-Fraenkel set theory by replacing the axiom of infinity with its negation is a finite set theory. In this talk we shall give an overview of old and new

results about finite set theory, including Ackermann's classical interpretation of *ZF_fin* in Peano Arithmetic, and recent joint work with Jim Schmerl and Albert Visser on the metamathematics of finite set theory. In particular, I plan to explain why, contrary to a widely held misconception, Peano arithmetic and *ZF_fin* are not bi-interpretable.

Thursday, March 12, 2009
5:15–6:15 p.m.
Speaker: Joe Mourad, Georgetown University
Place: Monroe Hall (2115 G Street), Room 267
Title: *Some descriptive set theory for recursion theorists*
Part IV: How to build a real

Abstract: This last installment will investigate how to use the *Q^* hierarchy to build reals of increasing complexity. In order to control the approximation the Suslin representation of a Borel set will be introduced and used to establish the key closure property.

Thursday, March 5, 2009
5:15–6:15 p.m.
Speaker: Joe Mourad, Georgetown University
Place: Monroe Hall (2115 G Street), Room 267
Title: *Some descriptive set theory for recursion theorists*
Part III: Calculating the size of the fixed point

Abstract: Having defined the syntactic system and shown that a countable fixed point exists, we will further explore its closure properties and attempt to get upper and lower bounds in terms of known countable ordinals. The fixed point also gives a natural model of second-order arithmetic. We will also show that this model satisfies comprehension for Sigma^1_2 formulas.

Thursday, February 26, 2009
5:15–6:15 p.m.
Speaker: Joe Mourad, Georgetown University
Place: Monroe Hall (2115 G Street), Room 267
Title: *Some descriptive set theory for recursion theorists*
Part II: The passage to ultra effective descriptive set theory

Abstract: Continuing a look at understanding Sigma^1_2 sentences, we will proceed to define a syntactic system and investigate its fixed point. This is joint work with Mark Lance and I will also discuss some of the motivation that led to this collaborative enterprise.

Thursday, February 19, 2009
5:15–6:15 p.m.
Speaker: Joe Mourad, Georgetown University

Place: Monroe Hall (2115 G Street), Room 267
Title: *Some descriptive set theory for recursion theorists*
Part I: The passage to ultra effective descriptive set theory

Abstract: In my initial talk, I mostly introduced a platform for looking at descriptive set theory focusing on understanding Sigma^1_2 sentences. The key take away was that the same setup that generates constructions in classical recursion theory (a second order arithmetic bounded formula) works to generate the basic objects in descriptive set theory/classical analysis. In this first part we develop this further. We will look at a semantic approach and motivate a new syntactic approach, the latter constituting joint work with Mark Lance of the Georgetown University Philosophy Department.

Along the way we will look at some classical results such as Suslin's characterization of Borel sets as analytic sets with analytic complements and ideas such as are found in Shoenfield's Absoluteness Theorem. The emphasis will be on getting a feel for what are the most critical ideas in such results.

Thursday, February 12, 2009
11:00a.m.–12:00 noon
Speaker: Russell Miller, CYNY, New York
http://qcpages.qc.cuny.edu/~rmiller/
Place: Monroe Hall (2115 G Street), Room 267
Title: *Degrees of categoricity of algebraic fields*

Abstract: Let F be a computable field: a countable field in which the addition and multiplication are given by computable functions. We investigate the Turing degrees d such that F is **d**-computably categorical, meaning that d is able to compute isomorphisms between F and any other computable field isomorphic to F. We prove that algebraic fields can fail to be **0'**-computably categorical, but that there is a degree **d**, low relative to **0'**, such that every algebraic field is **d**-computably categorical. We also prove analogous results, one jump lower, for computable fields with splitting algorithms.

Thursday, January 29, 2009
5:15–6:15 p.m.
Speaker: Joe Mourad, Georgetown University
Place: Monroe Hall (2115 G Street), Room 267
Title: *Some descriptive set theory for recursion theorists: Introduction*

Abstract: In this first talk of what will probably be a series of talks I will mostly motivate an approach to descriptive set theory that focuses on understanding Sigma^1_2 sentences from a constructive point of view. This talk will be followed up by introducing some joint work that I have done with Mark Lance of the Georgetown University Philosophy Department.

We will also review some classical results along the way as well as make connections to

classical recursion theory and proof theory. As far as possible, the material will be presented so as to be understandable to beginning graduate students and advanced undergraduates.

Thursday, January 22, 2009
5:15–6:15 p.m.
Speaker: Jennifer Chubb, GWU
http://home.gwu.edu/%7Ejchubb/
Place: Monroe Hall (2115 G Street), Room 267
Title: *Algorithmic properties of relations on computable structures*

Abstract: We consider algorithmic properties of additional relations definable on computable structures. For example, for a computable linear ordering we may consider the successor relation, which does not have to be computable. I will discuss some general results in the literature, and present some examples from my recent collaborative projects. We will see that for a large class of linear orderings, the Turing degree spectrum of the successor relation is closed upward in the computably enumerable degrees. Then, we will use algorithmic information theory to analyze the strong degree spectra of certain initial segments of computable linear orderings and compare them to the Turing degree spectra of these segments.