LOGIC SEMINAR
***FALL* 2008**

Series on Orderings in Logic and Topology

Special Session Orderings in Logic and Topology at the Joint Mathematics Meetings
Thursday January 8, 2009, 8:00 a.m. –10:50 a.m.
Thursday January 8, 2009, 1:00 p.m. –5:50 p.m.

Thursday, October 23, 2008
5:15–6:15 p.m.
Speaker: John Goodrick, University of Maryland
http://www.math.umd.edu/~goodrick/
Place: Monroe Hall (2115 G Street), Room 267
Title: *The Schröder-Bernstein property for ordered structures and generalizations,* part I
Abstract: We say that a theory has the Schröder-Bernstein property if any two of its models which are elementarily bi-embeddable are necessarily isomorphic. Part of my thesis showed that the theory of any infinite linearly ordered structure does *not* have the Schröder-Bernstein property by a modification one of Shelah's "many-model arguments"— essentially one can build Skolem hulls over a collection of sufficiently different-looking orderings and prove that some of the resulting models are bi-embeddable but nonisomorphic. The same arguments just as easily show that a theory does not have the Schröder-Bernstein property if there is an infinite subset of any model which is orderable by a single formula (i.e., the theory is unstable) or even by a formula in *L*_{infty, omega} (e.g., if the theory has OTOP). If there is time, I will also discuss how a Dushnik-Miller type argument gives an alternate construction of counterexamples to the Schöder-Bernstein property.

Thursday, October 2, 2008
5:15–6:15 p.m.
Speaker: Jennifer Chubb, GWU
http://home.gwu.edu/%7Ejchubb/
Place: Monroe Hall (2115 G Street), Room 267
Title: *Computability, topology, and ordered groups,* part III

Abstract: In this talk, we will see the details of a proof that is a good example of a standard type of computability theoretic construction. We will, following Downey and Kurtz, construct a group isomorphic to a countable, infinite direct sum of the integers, but that admits no computable ordering. We will discuss consequences for the space of orders.

Thursday, September 25, 2008
5:00–6:00 p.m.
Speaker: Jennifer Chubb, GWU
http://home.gwu.edu/%7Ejchubb/

Place: Monroe Hall (2115 G Street), Room 267
Title: *Computability, topology, and ordered groups,* part II

Abstract: A countable group is *computable* if its universe is computable and there is an algorithm for computing "products" in the group. This second talk will include a basic introduction to computability theory and will focus on algorithmic properties of orderings on computable groups. We will see some examples of standard computability theoretic constructions, including the construction of an orderable computable group admitting no computable ordering.

Thursday, September 11, 2008
5:00–6:00 p.m.
Speaker: Jennifer Chubb, GWU
http://home.gwu.edu/%7Ejchubb/
Place: Monroe Hall (2115 G Street), Room 267
Title: *Computability, topology, and ordered groups,* part I

Abstract: A group is left-orderable if there is an ordering of its elements that is invariant under multiplication from the left, and bi-orderable if there is an ordering that is simultaneously left- and right-invariant. There are a number of interesting questions surrounding these objects concerning the cardinality of the collection of orderings for a given group, as well as the topological structure of this collection endowed with a very natural topology.
This is the first in a series of three talks surveying the theory of ordered groups, in large part from a computability theoretic point of view, and their applications in topology.

Thursday, October 30, 2008
5:15–6:15 p.m.
Speaker: John Goodrick, University of Maryland
http://www.math.umd.edu/~goodrick/
Place: Monroe Hall (2115 G Street), Room 267
Title: *The Schröder-Bernstein property,* part II
Abstract: This talk will focus on the Schröder-Bernstein property for theories of abelian groups — that is, when does elementary bi-embeddability always imply isomorphism? It turns out that the complete theory $Th(G, +)$ of an abelian group G has the SB property if and only if G is the direct sum of a divisible group and a torsion group of bounded exponent, and is also equivalent to G having the DCC on parameter-definable subgroups. Also, in this context, elementary embeddings turn out to be the same thing as pure embeddings in the sense of algebra. Then we will discuss the much harder problem of characterizing the SB property for abelian groups with extra definable structure (e.g., predicates for subgroups), for which we do not currenly have a good answer. If there is time, we may talk about how a Dushnik-Miller type argument can be used to construct counterexamples to the SB property for certain theories of abelian groups. The question of when $Th(G, +)$ has an effective version of the SB property could also be interesting.

OTHER LOGIC TALKS

Graduate Student Seminar

Friday, December 5, 2008
11:30a.m.–12:30 p.m.
Monroe Hall (2115 G Street), Room 267
Speaker: Valentina Harizanov, GWU
Title: *Turing degrees of complexity*
Abstract: In 1936 Alan Turing introduced the notion of an ideal computer and gave a negative answer to Hilbert's decision problem. Two years later in his dissertation Turing defined the notion of a Turing machine augmented with the so called oracle which provides external information during the computation. This led Emil Post to develop in 1944 a powerful notion of Turing degree as a measure of relative algorithmic complexity of sets of natural numbers and problems they encode. There are uncountably many Turing degrees, they are partially ordered and form an upper semilattice. We will show how some familiar mathematical objects can have certain Turing degrees by encoding sets of natural numbers into them. Although the talk will be based on topics of current research interest, it will not require prior knowledge of computability theory.

Friday, September 12, 2008
11:30a.m.–12:30 p.m.
Monroe Hall (2115 G Street), Room 267
Speaker: Jennifer Chubb, GWU
Title: *Model theory and computability*
Abstract: The notion of computability has its origins in the work of Alan Turing, who in 1936 made precise the notion of machine computation. In computable model theory we are interested in determining the properties of mathematical structures and their theories that are accessible to us in an effective way. A mathematical structure is computable if its domain, relations, and functions can all be described by algorithms. The computability of a structure by no means implies that everything we might want to know about it is algorithmically accessible. I will provide a brief introduction to both model theory and computability and describe some examples. Then, I will describe some of the types of questions of interest in this area, and present some results from recent research in computable model theory. This talk will be accessible to undergraduates.

Special Topology/Logic Lecture
Thursday, November 13, 2008
4:15–5:30 p.m.
Speaker: Ivan Dynnikov, University of Moscow
http://higeom.math.msu.su/people/dynnikov/
Place: Bell Hall (2029G Street), Room 108
Title: *A geometric approach to braid conjugacy*
Abstract: I will speak about an algorithm that is conjectured to solve the conjugator search problem for braids in polynomial time. It is based on geometric presentation of braids as homeomorphisms of a punctured disk rather than algebraic one.