LOGIC SEMINAR
***Spring* 2011**

Previous seminars at: http://home.gwu.edu/~harizanv/index.html#GW_Logic_Seminar_

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Wednesday, May 4, 2011
3:45–5:00 p.m.
Speaker: Alexei Kolesnikov, Towson University
http://pages.towson.edu/akolesni/
Place: Monroe Hall (2115 G Street), Room 267
Title: *Generalized Amalgamation and Homology in Model Theory*
Abstract: The first part of this talk will be a non-technical survey of generalized amalgamation properties in model theory, with focus on Shelah's and Zilber's work on excellent classes. The recent research of the speaker with John Goodrick and Byunghan Kim on the construction of homology groups is motivated, in part, by the desire to better understand generalized amalgamation. The second part of the talk will focus on the construction of homology groups for certain families of functors whose properties are motivated by model theory.

Thursday, April 28, 2011
5:15–6:15 p.m.
Speaker: Wesley Calvert, Southern Illinois University
http://www.math.siu.edu/calvert/index2.html
Place: Monroe Hall (2115 G Street), Room 267
Title: *Degrees Coded in Geometry*
Abstract: It has been known since the Ph.D. thesis work of Linda Richter in the 1980s that algebraic structures --- groups, for instance --- can encode Turing degrees in an intrinsic (isomorphism-invariant) way. From more recent work, we know that structures arising from algebraic geometry, including schemes, have a similar capacity. Since much of the difficulty around understanding these results comes from the definitions in algebraic geometry, a significant part of the present talk will focus on introducing the structures to be constructed.

Wednesday, April 20, 2011
5:15–6:15 p.m.
Speaker: Byunghan Kim, Yonsei University, South Korea
http://web.yonsei.ac.kr/bkim/
Place: Monroe Hall (2115 G Street), Room 267
Title: *Tree Property* 1
Abstract: I will talk about recent joint work (with Hyeung-Joon Kim) on the notions related to the tree property 1 (TP_1) introduced by Shelah, or equivalently 2-strong order property. We give a type-counting criterion for TP_1 and show the equivalence of TP_1 and

k-TP$_1$. Then we introduce the notions of weak k-TP$_1$ for $k>1$, and also give type-counting criteria for them. We do not know whether weak k-TP$_1$ implies TP$_1$, but at least we prove that each weak k-TP$_1$ implies 1-strong order property. Our generalization of tree-indiscernibility results of Dzamonja and Shelah is crucially used throughout the paper.

Wednesday, April 20, 2011
3:45–5:00 p.m.
Speaker: John Goodrick, University of Andes, Bogotá, Colombia
http://matematicas.uniandes.edu.co/~goodrick/
Place: Monroe Hall (2115 G Street), Room 267
Title: *Homology Groups for Types in Model Theory*
Abstract: We present definitions of homology groups $H_n(p)$ for a complete type p in a stable (or simple, or rosy) theory. We show how these groups relate to certain previously studied amalgamation properties. We can compute $H_2(p)$ "explicitly" for strong types in stable theories and show that the groups that can occur as $H_2(p)$ are precisely the profinite abelian groups.

Wednesday, April 13, 2011
5:15–6:15 p.m.
Speaker: Joe Mourad, Georgetown University
Place: Monroe Hall (2115 G Street), Room 267
Title: *Tree Representations, Arithmetic Hierarchy, and Reverse Mathematics*
Abstract: This talk will be self-contained, but continue with the theme of looking at the arithmetic hierarchy from the perspective of higher recursion theory/descriptive set theory. Tree representations of arithmetic sets as well as basis theorems will be discussed. This will provide a context to give a brief introduction to reverse mathematics. Model theoretic methods as well as recursion theoretic methods will be discussed.

Special Joint Logic-Quantum Computing-Topology Seminar
Thursday, March 31, 2011
6:15–7:15 p.m.
Speaker: Zbigniew Oziewicz, Universidad Nacional Autonoma de Mexico
Place: Monroe Hall (2115 G Street), Room 267
Title: *Applied Category Theory: Graph-Operad Logic* (*Unified Approach to Frobenius Algebras: Associative and Non-Associative*)
Abstract: We are looking for necessary and sufficient conditions on low-dimensional algebras to be Frobenius algebras. We introduce the concept of a solvable Frobenius algebra. We formulate Frobenius algebra within the abelian monoidal category of operad of graphs.

Wednesday, March 9, 2011
5:15–6:15 p.m.
Speaker: Joe Mourad, Georgetown University
Place: Monroe Hall (2115 G Street), Room 267
Title: *Foundations of Mathematics and Constructing Real Numbers,* Part III

Abstract: Although this talk will be self-contained, we will continue to look at systems that give canonical constructions of real numbers. In the previous talks we stressed the importance of constructing sets of real numbers in a controlled way and of representing such sets as single objects. We will apply this strategy to Pi^0_n and Sigma^0_n classes by first taking the complements and expressing them as Pi^1_1 classes and then looking at the complement again as a Sigma^1_1 class. Connections to uniformization theorems such as the Kondo-Addison Theorem and to questions in reverse mathematics will be made.

Wednesday, March 2, 2011
5:15–6:15 p.m.
Speaker: Dmitry Trushin, Moscow State University, Moscow
Place: Monroe Hall (2115 G Street), Room 267
Title: *Differential Nullstellensatz*
Abstract: In this lecture, I will discuss a naive version of a geometric approach to differential equations. This approach allows us to study differential equations using methods of algebraic geometry. Since many results in differential algebra appeared in model theory, a relation of differential algebra with model theory will be shown. I will discus polynomials and formulas, differential closedness and saturation, quantifier elimination and constructibility, Noetherian condition and stability, and the relation between the space of types and the spectrum with constructible topology.

Wednesday, February 23, 2011
5:15–6:15 p.m.
Speaker: Joe Mourad, Georgetown University
Place: Monroe Hall (2115 G Street), Room 267
Title: *Foundations of Mathematics and Constructing Real Numbers,* Part II
Abstract: Although this talk will be self-contained, we will continue to look at systems that give canonical constructions of real numbers. The notions of stages and levels in such constructions will be made precise and impredicate systems will be presented. It will turn out that representations in terms of trees are very important. We will explore how to canonically construct these trees. The connection to uniformization theorems such as the Kondo-Addison Theorem will be made.

Wednesday, February 16, 2011
5:15–6:15 p.m.
Speaker: Joe Mourad, Georgetown University
Place: Monroe Hall (2115 G Street), Room 267
Title: *Foundations of Mathematics and Constructing Real Numbers,* Part I

Abstract: We will look at construction of real numbers throughout history with an eye to seeing how our conception of Mathematics grows along with the complexity of the real numbers that are constructed. We will see how this conception has to lead to current research programs in the Foundations of Mathematics. This talk will be very elementary with the continuation the following week, touching on current research questions.

Wednesday, February 9, 2011
5:15–6:15 p.m.
Speaker: Valentina Harizanov, GWU
Place: Monroe Hall (2115 G Street), Room 267
Title: *Computable Binary Trees and Their Paths*
Abstract: An effectively closed set may be viewed as the set of all infinite paths through a computable binary tree. These sets have been extensively studied in computability theory. We will show how some problems in algebra and computable algebra can be translated to problems about effectively closed sets.

Wednesday, February 2, 2011
5:15–6:15 p.m.
Speaker: Patrick O'Neill, Towson State University
Place: Monroe Hall (2115 G Street), Room 267
Title: DNA *Splicing Systems, Logically and Algebraically*
Abstract: DNA computing is attractive for many reasons, both theoretical and practical. Many different models of DNA computation have been proposed, and universality results are, in general, easy to obtain. Not all models, however, are so easily characterized. In particular, finite splicing systems, though among the earliest and most biologically relevant models of DNA computation, have not been shown to conform to any known computational class. After comparing the expressive power of splicing systems to alternative models, we review what is currently known about finite splicing systems by presenting partial characterizations of splicing languages in terms of several canonical sub-regular classes, as well as describing algebraic and model-theoretic lenses for viewing the problem. This talk aims to be accessible to non-biologists as well as non-logicians.