BLAST 2023 Tuesday Schedule

12:30 - 1:15 – Registration and coffee

1:15 - 1:30 – Opening remarks

1:30 - 2:20 – Andy Zucker (plenary talk)
Infinite-dimensional Ramsey theory for binary free-amalgamation classes

2:20 - 2:55 – coffee break

2:55 - 3:25 – Ross Willard
That damned problem of Eilenberg and Schützenberger

3:30 - 4:00 – ~~Salma Shaheen~~ Ross Willard
Algebras from finite group actions and a question of Eilenberg and Schützenberger

4:10 - 5:00 – Keith Kearnes (first tutorial)
Higher commutator theory

Plenary Talk: Infinite-dimensional Ramsey Theory for Binary Free-amalgamation Classes

Andy Zucker (*University of Waterloo*)
Natasha Dobrinen (*University of Notre Dame*)

When one attempts to generalize Ramsey's theorem to color the infinite subsets of the natural numbers, one must place definability constraints on the colorings considered. Ellentuck introduces a finer topology on the infinite subsets of naturals and shows that for any finite coloring of this space which has the Property of Baire with respect to this topology, one can find an infinite subset of naturals all of whose further infinite subsets receive the same color. Upon attempting to generalize this result to countably infinite structures, then in addition to these definability constraints, the theory of big Ramsey degrees places a fundamental limitation on how large of a subspace of structures one can expect such a generalization to hold. In recent joint work with Natasha Dobrinen, we state and prove such a generalization for Fraïssé limits of finitely constrained binary free amalgamation classes and show that this result is in many ways best possible.

That Damned Problem of Eilenberg and Schützenberger

Emily Carlson
Mehul Gupta (*University of Toronto*)
George McNulty (*University of South Carolina*)
Ross Willard (*University of Waterloo*)

In a 1976 paper, Samuel Eilenberg and M.P. Schützenberger posed a provocative problem about finite semigroups, which Mark Sapir solved in 1988: if the pseudovariety generated by a finite semigroup S is finitely axiomatizable (relative to the class of all finite semigroups), is this so because the variety generated by S is finitely axiomatizable? (Sapir's answer: yes). The same question can be posed for any finite algebra in a finite signature, and this expanded question is what universal algebraists call the Eilenberg-Schützenberger problem.

In this talk I will state the problem more carefully and explain just how far we are from a solution. I will describe an "obvious reason" for a positive answer which, so far, works in all special cases for which the problem has been answered. Time permitting, I will describe our recent work on this problem in the context of finite-dimensional nonassociative algebras over finite fields.

Algebras from Finite Group Actions and a Question of Eilenberg and Schützenberger

Salma Shaheen (*University of Waterloo, Canada*)
Ross Willard (*University of Waterloo, Canada*)

In 1976, S. Eilenberg and M.P. Schützenberger posed the following Diabolical question: if A is a finite algebraic structure, Σ is the set of all identities true in A, and there exists a finite subset F of Σ such that F and Σ have exactly the same finite models, must there also exist a finite subset F' of Σ such that F' and Σ have exactly the same finite and infinite models? (That is, must the identities of A be "finitely based"?). It is known that any counter example to their question must be inherently nonfinitely based (INFB) but not inherently nonfinitely based in the finite sense (INFBfin). In this talk, I will show that the algebras constructed by Lawrence and Willard from group action do not provide a counter example to this question. If time permits, I will give the first known examples of inherently nonfinitely based "automatic algebras" constructed from group actions.

Tutorial: Higher Commutator Theory

Keith Kearnes (*University of Colorado*)

The commutator operation of group theory has been generalized in many different ways. These generalizations permit one to import ideas from group theory into other areas of mathematics, but the subject has developed beyond that to include original concepts. I will start by discussing the intuition behind, and the scope of, the theory of the commutator of two or more variables and end with applications and problems.