MARIA CHUDNOVSKY, Princeton
Recent Progress on the Erdos-Hajnal Conjecture

What is the effect of excluding an induced subgraph on the global structure of a graph? While there do not seem to be general structural consequences, a conjecture of Erdos and Hajnal states that graphs with forbidden induced subgraphs behave very differently from general graphs; more precisely they contain much larger cliques or stable sets. This conjecture is still open. In this talk we will discuss the history of this problem and some recent theorems related to it.

SARAH MAYES-**TANG**, University of Toronto
Listening Before Teaching: Building mathematical understanding by understanding our students

Despite generations of curricular reforms and investments in outreach activities, mathematics remains one of the most misunderstood fields of study. Tied to this problem of reputation is a representation problem: the numbers of women and those from racial minorities are still unacceptably low in math, especially at the senior ranks. How can we make progress towards solving the dual reputation and representation problems that face math? I will discuss recent research in the social sciences that points towards the importance of listening to and understanding our students and mentees at all levels, from grade school through grad school. I will give examples of concrete practices that build understanding by first understanding students and discuss how listening has played a key role in recent innovations to an introductory calculus program at the University of Toronto.

ANTONIO MONTALBAN, University of California, Berkeley
A Robuster Scott Rank

The Scott rank was introduced in the 60's as measure of complexity for algebraic structures. There are various other ways to measure the complexity of structures that give ordinals that are close to each other, but are not necessarily equal. We will introduce a new definition of Scott rank where all these different ways of measuring complexity always match, obtaining what the author believes it the correct definition of Scott Rank. We won't assume any background in logic, and the talk will consist mostly of an introduction to these topics.

KIRSTEN MORRIS, Unversity of Waterloo
Optimal controller and actuator design for partial differential equations

Control can be very effective in altering dynamics. One issue for partial differential equations is that performance depends not only on the controller, but also on its location and spatial design. Existence of concurrent optimal controller and spatial distribution has been established for several classes of partial differential equations and objectives.Some of these results will be discussed and illustrated with examples.

MALABIKA PRAMANIK, University of British Columbia, Vancouver
On directions and operators

Fundamental operators arising in Euclidean harmonic analysis are often associated with sets of directions. What are these operators? Why are they important? How do direction sets enter the picture and influence their behaviour? The central issues underpinning these questions are rooted in analysis and geometry, but recently tools from extremal combinatorics and algebraic geometry have also played an important role in their study. This talk will provide a brief history of this genre of problems, compare and contrast a few such operators and discuss some modern approaches for their treatment.

LAUREN WILLIAMS, Harvard

Probability and combinatorics: hopping particles and Macdonald polynomials

The asymmetric simple exclusion process (ASEP) is a model of particles hopping on a one-dimensional lattice. It was initially introduced by Macdonald-Gibbs-Pipkin to provide a model for translation in protein synthesis. On the other hand, Macdonald polynomials are a remarkable family of multivariate polynomials which generalize Schur polynomials and Hall-Littlewood polynomials. I'll explain how the study of the ASEP on a ring leads to new formulas for Macdonald polynomials.