Mathematics, Statistics, and Computer Science **@ UIC**

Plenary Talk - GSCC 2026

Threshold phenomena for random discrete structures

Jinyoung Park (NYU)

Abstract: In this expository talk, we will walk through some basics of the random graph theory, aiming to understand a high-level motivation for the Kahn–Kalai Conjecture (now the Park–Pham Theorem), which has been a central conjecture in the area of probabilistic combinatorics. Below is a more formal description of the work that we will discuss, but I will try to use concrete examples rather than formal language, and will not assume much prior knowledge other than undergraduate-level combinatorics and probability.

More formal description: for a finite set X, a family F of subsets of Xis said to be increasing if any set A that contains B in F is also in F. The p-biased product measure of F increases as p increases from 0 to 1, and often exhibits a drastic change around a specific value, which is called a ''threshold.'' Thresholds of increasing families have been of great historical interest and a central focus of the study of random discrete structures, with estimation of thresholds for specific properties the subject of some of the most challenging work in the area. In 2006, Jeff Kahn and Gil Kalai conjectured that a natural (and often easy to calculate) lower bound q(F) (which we refer to as the "expectation-threshold") for the threshold is in fact never far from its actual value. A positive answer to this conjecture enables one to narrow down the location of thresholds for any increasing properties in a tiny window.

Sunday, March 29 at 11:00 AM in ARC 242

This Plenary talk is part of the Graduate Student Combinatorics Conference (GSCC) 2026. The rest of the schedule and more information can be found here: https://sites.google.com/view/gscc2026/home

Sunday, March 29 at 11:00 AM in ARC 242