

# Discrete Mathematics Seminar

Illinois State University

2:00–2:50 pm, March 9

Speaker: Xavier Pérez-Giménez, University of Nebraska-Lincoln

## The chromatic number of a random lift of $K_d$

An  $n$ -lift of a graph  $G$  is a graph from which there is an  $n$ -to-1 covering map onto  $G$ . Amit, Linial, and Matoušek (2002) raised the question of whether the chromatic number of a random  $n$ -lift of  $K_5$  is concentrated on a single value. We consider a more general problem, and show that for fixed  $d \geq 3$  the chromatic number of a random lift of  $K_d$  is (asymptotically almost surely) either  $k$  or  $k + 1$ , where  $k$  is the smallest integer satisfying  $d < 2k \log k$ . Moreover, we show that, for roughly half of the values of  $d$ , the chromatic number is concentrated on  $k$ . The argument for the upper-bound on the chromatic number uses the small subgraph conditioning method, and it can be extended to random  $n$ -lifts of  $G$ , for any fixed  $d$ -regular graph  $G$ . (This is joint work with JD Nir.)

