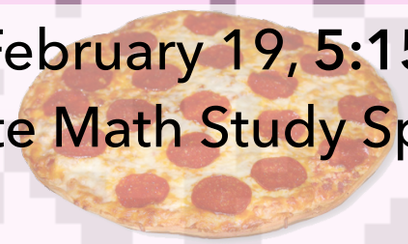
Radical Pi presents:

Oriented Percolation and the Contact Process on $\mathbb{Z}$

by Professor David Sivakoff

In probability theory, a stochastic interacting particle system is a process on a graph (classically a lattice, like $\mathbb{Z}^d$) in which each vertex assumes one of two states (occupied or vacant), and randomly updates its state in continuous time based on the states of its neighbors. One of the most well-known stochastic interacting particle systems is the contact process, in which an occupied vertex becomes vacant at rate 1, and a vacant vertex becomes occupied at rate $b > 0$ times the number of its neighbors that are occupied. Taking our graph to be the integer lattice, $\mathbb{Z}$, and starting with only the origin occupied, a simple analysis shows that if b is too small, then all vertices will eventually become vacant with probability one. A more difficult question is, if the origin is initially the only occupied vertex, can we take b large enough so that there is a positive probability that the occupied vertices never go extinct? We will show that the answer is "Yes" by exploiting a relationship between this process and another well-known model in probability theory called oriented site percolation, and much of the talk will be spent analyzing this model using the famous "contour argument."

Wednesday, February 19, **5:15** PM
Undergraduate Math Study Space (MA 052)
Free pizza!



http://patternandprocess.org/3-4-basic-two-dimensional-contact-process/