The SUMO Speaker Series for Undergraduates
(food from Pizza Chicago)
Wednesday, February 10
4:40-5:30, room 380C

Dessins d’enfants and complex rational functions

Prof. Greg Brumfiel

Abstract: A planar dessin d’enfant (child’s drawing) D is a finite connected graph in the complex plane whose vertices are alternately labeled 0 and 1. It turns out that all planar dessins D arise as the inverse image $f^{-1}([0, 1])$ of the real unit interval, under a very special type of rational function $f(z) = p(z)/q(z)$, where $p(z)$ and $q(z)$ are polynomials with complex algebraic numbers as coefficients. If an algebraic number like $\sqrt[3]{2}$, for example, occurs as one of the coefficients in $f(z)$, it can be replaced by one of the other two complex roots of the polynomial $T^3 - 2$, yielding a new rational function $g(z)$ and a new dessin $g^{-1}([0, 1])$, a kind of mutant of D related geometrically to D in some crude respects. Around 1980, Grothendieck and others initiated a provocative study of the relations between geometric properties of dessins and the theory of algebraic numbers and algebraic curves. I will give some examples of dessins and their mutants, and indicate some of the interesting general theory.

sumo.stanford.edu/speakers