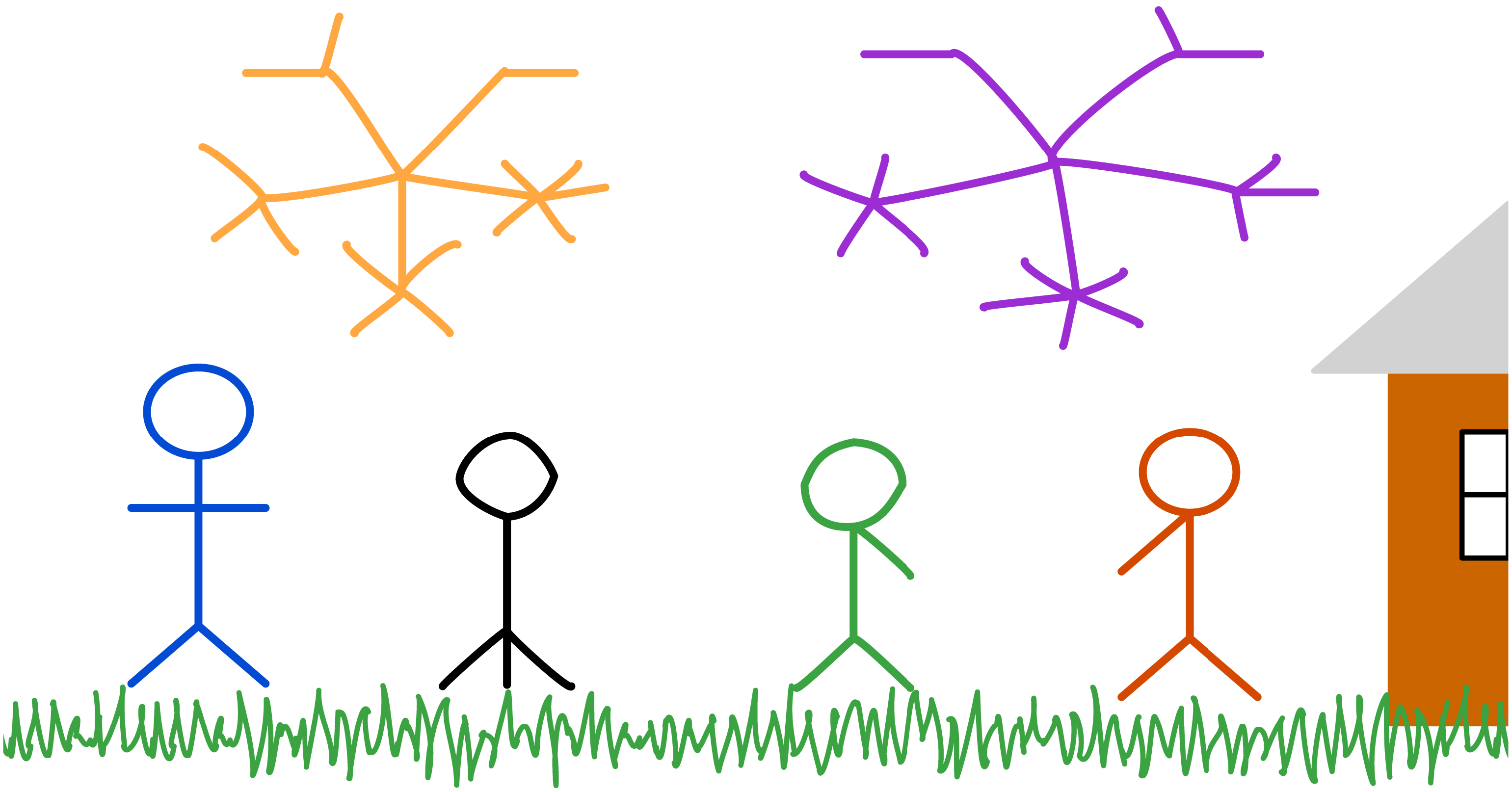
The SUMO Speaker Series for Undergraduates

(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.

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