Math and Stat Colloquium

Tuesday, Nov. 13

11 a.m. AGRS 141

Refreshments will be served in the Animal Science Lounge at 10:30 a.m.

Speaker:

Michael Barrus

Brigham Young University

"Degree-associated graph reconstruction: Playing with a marked deck."

Abstract: The famous Graph Reconstruction Conjecture, due to P. J. Kelly and S. M. Ulam, states that every simple graph on n vertices can be uniquely determined given its "deck of cards," the collection of its induced subgraphs on n - 1 vertices. The Conjecture has remained unresolved for over 70 years, though many partial results are known and many flawed proofs have arisen. A definite answer (either affirmative or negative) to the Conjecture would likely have interesting implications for questions on graph isomorphism. A related problem asks how few of a graph's cards can be presented before it is possible to uniquely reconstruct the graph. It is known that almost every graph can be reconstructed given three carefully chosen cards, though graphs exhibiting much symmetry typically require several more cards.

We summarize highlights in the history of the Reconstruction Conjecture and present results on the degree-associated reconstruction number drn(G) of a graph G. This parameter, introduced recently by S. Ramachandran, is the minimum number of cards necessary to uniquely reconstruct a graph when each card is presented with the degree of the deleted vertex. We describe a method for constructing vertex-transitive graphs with arbitrarily high degree-associated reconstruction numbers, but we introduce the notion of coherence, a property that ensures that several vertex-transitive graphs, including all hypercubes, can be reconstructed from at most three degree-associated cards. This is joint work with Douglas B. West.