# Combinatorial methods in embedding theory

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007 Kemeny Hall, 4:00 pm
(Tea 3:30 pm 300 Kemeny Hall)

**Abstract**

The talk will discuss some recent progress in embeddability of polyhedra in Euclidean spaces and in products of trees. In topology, a polyhedron is a space triangulated by a simplicial complex. The methods involve little to no algebraic topology but a fair amount of combinatorics of cubical complexes and other non-simplicial cell complexes.

A simple consequence is the following "explanation" of the statement of the Kuratowski graph planarity criterion (a graph is planar if and only if it does not "contain" a $K_5$ nor a $K_{3,3}$): There exist precisely two 3-dimensional "dichotomial" cell complexes (that is, cell complexes where to every cell there corresponds a unique cell with the complementary set of vertices), and their 1-skeleta are $K_5$ and $K_{3,3}$

This is no accident, since 4-dimensional dichotomial cell complexes yield a similar "explanation" of 6/7 of the statement of the Robertson–Seymour–Thomas intrinsic linking of graphs of 3-space. Further details can be found in arXiv:1103.5457 and arXiv:1102.0696.

This talk should be accessible to graduate students.