Undergraduate level talk:

Frameworks in motion: theory, design, and fabrication

Tuesday January 11th at 4pm

Zoom link
Meeting ID: 997 1738 3206

What do your umbrella, a folding gate, and a scissor lift have in common? They are all made of rigid parts attached at joints designed to yield a structure that can move with one degree of freedom and then locked in a rigid state to perform a useful function. In 1981, famed architect Santiago Calatrava wrote a PhD thesis, "Concerning the Foldability of Space Frames," consisting of a systematic exploration of the geometry and design of foldable frameworks. I'll use his thesis as a jumping off point to explore the fundamentals of rigidity theory and share some ongoing work on the design of a tent framework in collaboration with architect Naomi Darling and Mount Holyoke students Sohini Bhatia, Stephanie Einstein, Nana Aba Turkson, and Zainab Umar.

Graduate level talk:

Geometric equations for matroid varieties

Monday January 10th at 4pm

Zoom link
Meeting ID: 981 1456 6070

Let x denote a k-dimensional subspace of $\mathbb{C}^n$ and let A_x be a $k \times n$ matrix whose rows are a basis for x. Although the matrix A_x is only well-defined up to a choice of basis, the subsets of columns that are linearly independent is invariant. The data of the linearly independent sets of columns is a matroid M_x on the columns of A_x. Can we find polynomial equations that cut out the set of all k-dimensional subspaces y such that $M_y = M_x$?. We will explore this question algebraically, showing that for some matroids that arise geometrically many non-trivial equations vanishing on Γ_x can be derived geometrically. This is joint work with Will Traves and Ashley Wheeler.