One of the central problems in commutative algebra concerns understanding the structure of an ideal in a polynomial ring. Abstractly, an ideal’s structure can be expressed through an object called its minimal resolution, but there is no explicit method to obtain a minimal resolution in general, even for the simpler and fundamental class known as monomial ideals.

In this talk, we will focus on resolutions of monomial ideals. In particular, I will introduce a new combinatorial method that provides a resolution of any monomial ideal using tools from discrete Morse theory.