Abstract: This talk will focus on providing a combinatorial means of establishing a lower bound on the depth of an ideal $I$ in a polynomial ring $R=\mathbb{k}[x_1, \ldots, x_n]$. One way to measure the depth of $R/I$ is by finding a regular sequence. While quite useful, such a sequence is not always easy to find. The notion of an initially regular sequence was introduced in recent joint work with Tai Ha and Louiza Fouli. Such sequences share key properties with regular sequences, including providing a bound on the depth of the ring, and are generally straightforward to find using a graphical representation of a monomial ideal, called the initial ideal, associated with $I$. Using properties of Gröbner bases, it can be shown that some initially regular sequences are actually regular sequences. Moreover, the lower bound provided by finding initially regular sequences is sufficiently robust to allow for the use of polarization when working with monomial ideals that are not square-free, resulting in applications of the work to more general classes of ideals. In addition, by focusing on initial ideals, the technique can be applied to general classes of ideals with a known Gröbner basis, such as binomial edge ideals or the ideals of equations of Rees algebras of edge ideals of graphs. The talk will include definitions and examples for all of these notions that will illustrate the results. The work presented in this talk is joint with Tai Ha and Louiza Fouli.

This is talk is part of the Distinguished Women in Mathematics Colloquium Series.