

**Applied Mathematics Colloquium**  
**December 11, 2018 – 12:00 PM**  
**170 Hope Street, Room 108**

**Introduction to the asymmetric simple exclusion process  
(from a combinatorialist's point of view)**

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**Abstract:**

The asymmetric simple exclusion process (ASEP) is a model of particles hopping on a one-dimensional lattice, subject to the condition that there is at most one particle per site. This model was introduced in 1970 by biologists (as a model for translation in protein synthesis) but has since been shown to display a rich mathematical structure. There are many variants of the model -- e.g. the lattice could be a ring, or a line with open boundaries. One can also allow multiple species of particles with different "weights." I will explain how one can give combinatorial formulas for the stationary distribution using various kinds of tableaux. I will also explain how the ASEP is related to interesting families of orthogonal polynomials, including Askey-Wilson polynomials, Koornwinder polynomials, and Macdonald polynomials. Based on joint work with Sylvie Corteel (Paris) and Olya Mandelshtam (Brown).