Idaho State University

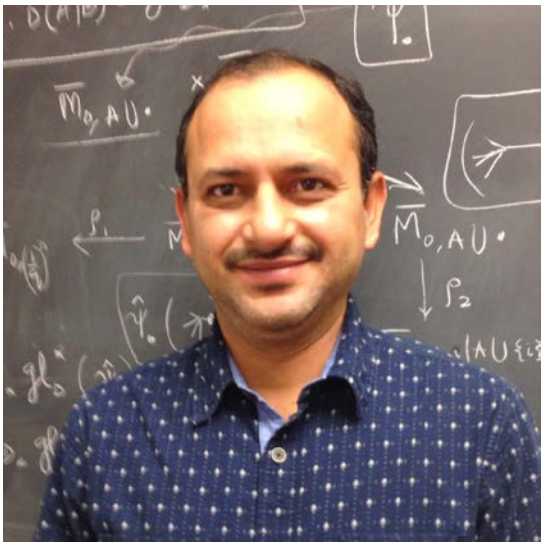
Department of Mathematics and Statistics

Colloquium

Generating Functions and Moduli spaces of pointed curves

~

Friday
October 26, 2018
4:00 pm
Rm. 306



Nand Sharma

A generating function is a way of encoding an infinite sequence of numbers (combinatorial information of interest) by treating them as the coefficients of a formal power series. Generating functions are an important tool in combinatorics and are useful in many areas of mathematics. For example, probability generating functions give a powerful way of encoding probabilities associated with certain discrete probability distributions. Furthermore, derivatives of these generating functions give information about the expected values and variance.

Moduli spaces (or parameter spaces), on the other hand, arise frequently in mathematics, especially in algebraic geometry. A simple example comes from considering circles in the plane with center at the origin. A moduli space parameterizing these circles should have a circle associated to each point of the space and nearby points should correspond to similar circles. As each circle is determined by its radius, the moduli space parameterizing these circles is the set of positive reals. One of the most studied moduli spaces in algebraic geometry are the moduli spaces of pointed rational curves. These spaces are an important area of study that has deep connections with mathematical physics, integrable systems, and quantum field theory.

In this talk, we will go over some of the combinatorial aspects of these two areas, and then look at a particularly important generating function called the Witten potential. This generating function encodes the intersection numbers corresponding to the intersection of certain algebraic curves of interest. Then, some recent results by the speaker constructing a new generating function for related moduli spaces, called Hassett spaces, will be presented. This new generating function is obtained by applying a partial differential operator to the Witten potential.

For colloquium attendees, there will be light refreshments at 3:30 pm in PS 317