Department of Mathematics Colloquium

Thursday, November 5, 2015
12:20 - 1:20
Luter 372

The Exceptional Laguerre Polynomials

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Abstract: While studying exactly and quasi-exactly solvable potentials in quantum mechanics, the following Bochner-type problem arose: to find all sequences of polynomials $\{p_n\}_{\mathbb{N}_0 \setminus A}$, with $\deg(p_n) = n$ and $|A| < \infty$, which are solutions of a second order differential equation of the form

$$\ell[y](x) = a_2(x)y''(x) + a_1(x)y'(x) + a_0(x)y(x);$$

are orthogonal with respect to a positive weight function $w(x)$ on a real interval; and all have moments $\{\mu_n\}$ of $w(x)$ exist and are finite. Up to a complex change of variables, the only such sequences are the "exceptional" polynomial sequences of Laguerre, Jacobi, and Hermite. We will discuss the properties of the exceptional Laguerre polynomials; in particular, the relationship of the exceptional Laguerre polynomial system to the classical Laguerre polynomial system and the spectral analysis of the associated differential expression.

Faculty and students are invited!
Refreshments will be served.