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Robert L. Bewernick and **Jeremy D. Dewar*** (j1mu@zaru.org), Department of Mathematics, Loyola Marymount University, 1 LMU Drive, Los Angeles, CA 90045, and **Eunice Gray, Nancy Y. Rodriguez** and **Randall J Swift** (rjswift@csupomona.edu), Department of Mathematics and Statistics, California State Polytechnic University, Pomona, CA 91768. *Birth-Death Processes with Polynomial Transition Rates.*

Deterministic population models describe population sizes and their dynamics. However, random chance plays a large part in the growth of real-life populations. In this talk, birth-death formulations for single and competing populations are developed. It is shown that these stochastic processes have expected values that agree with the corresponding deterministic models. A representation for the partial differential equation that a probability generating function of a birth-death process with polynomial transition rates is derived. This representation is in terms of Stirling numbers and is used to develop some of the properties of these processes. (Received September 21, 2005)