1077-AE-703 **Gidon Eshel*** (geshel@gmail.com), geshel@gmail.com, and **Andrew Ma** (geshel@bard.edu) and **Olivia Romeo** (geshel@bard.edu). *Short Term (Non-Asymptotic) Linear Stability of Ecosystems: The Role of Non-Self-Adjointness in Homogeneous and Heterogeneous Agricultural Systems.*

We demonstrate motivating undergraduate research of advanced linear algebra using 3 species Lotka-Volterra systems, on a single node and a spatially distributed mesh, as the choice toy problems.

We investigate short term linear stability of asymptotically stable systems under stochastic forcing, emphasizing propensity for variance growth due to constructive interactions of modes, and contrasting homogeneous systems (monocultures) from heterogeneous ones (where the same area is divided into numerous "crops" differing in their LV coefficients).

We show that while potentially instantaneously higher yielding, monocultures exhibit higher variance than heterogeneous systems under unit stochastic perturbation, which at times include collapse. By contrast, only degenerate heterogeneous systems occasionally collapse.

We show that the choice between monocultures and heterogeneous land uses is essentially a gamble that an excitation of a singular mode directly toward ruin will not be realized. If such a perturbation is realized, heterogeneous land use is the better choice, If it is not, monocultures may prove a more prudent choice.

The work thus demonstrates a viable, tractable path for reasonably well-trained undergraduates toward research of advances topics in leaner algebra. (Received September 22, 2011)