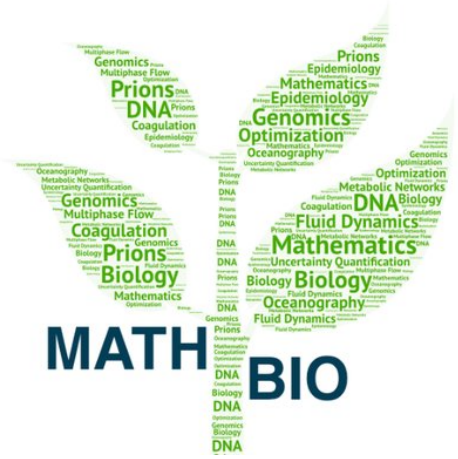
Mathematical Biology Seminar
Wednesday, April 13, 2022
Speaker: Dr. Amanda N. Laubmeier, Assistant Professor, Texas Tech University

Title: Incorporating temperature-dependence in biological control by generalist insect predators
Time: 11am
Zoom Link: https://ucmerced.zoom.us/j/98050375649
Passcode: 172069

Abstract: In agricultural ecosystems, one source of biological control comes from natural insect predators. However, many insects are generalist consumers, which form dense feeding networks with high levels of intraguild predation. These intraguild interactions make it difficult to determine the efficiency of insect predator communities. Additionally, since insects are ectotherms whose behavior is strongly regulated by temperature, predator efficiency is further complicated by environmental effects. In preliminary work, we investigated how temperature impacted predator efficiency through a system of ordinary differential equations. We incorporated observations of species abundance and feeding interactions from ten agricultural fields, to build realistic systems. Using an optimization approach to maximize the expected level of pest control, we determined the "best" balance of species in the predator community. Now, we expand the temperature-dependence in this model, by incorporating terms for the effect of temperature on hunting activity and sheltering. We repeat our prior optimization to determine how this extension changes the optimal predator community. We also explore increased temperature values and variability, to assess how climate change might affect expected biological control by natural insect communities.



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