Temple University Mathematics Colloquium

Michael Cortez

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will speak on

The eco-evolutionary dynamics of predator-prey systems: How does (co)evolution alter community level population dynamics?

ABSTRACT: Predators and their prey can exhibit cyclic temporal fluctuations. Lotka-Volterra and other ecological predator-prey models predict that in predator-prey cycles, peaks in prey abundance precede peaks in predator abundance. However, other kinds of cycles have been observed in predator-prey systems, e.g., antiphase cycles (where the species oscillate exactly out of phase) and cryptic cycles (where one species cycles while the other remains constant). This motivates the question, "why do cycle characteristics differ across systems?" Using eco-evolutionary models and fast-slow dynamical systems theory, I explore and characterize how evolution in prey, predators, or both species can alter cycle characteristics and drive qualitatively different community dynamics. My work identifies the mechanisms through which evolution in one species drives cryptic and antiphase cycles. Furthermore, I show that evolution in both species can effectively reverse the ordering of predator and prey peaks and drive cycles where peaks in prey abundance follow peaks in predator abundance. I revisit empirical rotifer-algae, phage-bacteria, gyrfalcon-rock ptarmigan, and mink-muskrat time series and show how the cycle characteristics predicted by my theory can be used to identify systems where species evolution or coevolution may have a significant influence on the community dynamics of predator-prey systems.

Friday, February 14, 2014
Lecture at 1:30 pm
Coffee, tea, and refreshments from 1:15 pm
Room 617, Wachman Hall
Department of Mathematics