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Applied Dynamical Systems Seminar

Speaker: Dr. Yuan Yuan

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Date: Friday, November 25, 2011

Time: 1:00 p.m.

Room: HH-3017

Title: *An Epidemic Model with Latency and Temporary Immunity*

Abstract:
A disease transmission model of SEIRS type with distributed delays in latent and temporary immune periods is presented. With general probability distributions in both of these periods, we address the threshold property of the reproductive number R_0 and the dynamical properties of the disease-free/endemic equilibrium points present in the model. More specifically, we a. show the dependence of R_0 on the probability distribution in the latent period and the independence of R_0 from the distribution in the temporary immunity, b. prove that the disease free equilibrium is always globally asymptotically stable when $R_0<1$, and c. establish that an endemic equilibrium exists when $R_0>1$ with different possible stability properties, according to the choice of probability functions in the latent and temporary immune periods. In particular, the endemic steady state is at least locally asymptotically stable if the probability distribution in the temporary immunity is a decreasing exponential function when the duration of the latency stage is fixed or exponentially decreasing. It may become oscillatory under certain conditions when there exists a constant delay in the temporary immunity period. Numerical simulations are given to verify the theoretical predictions.