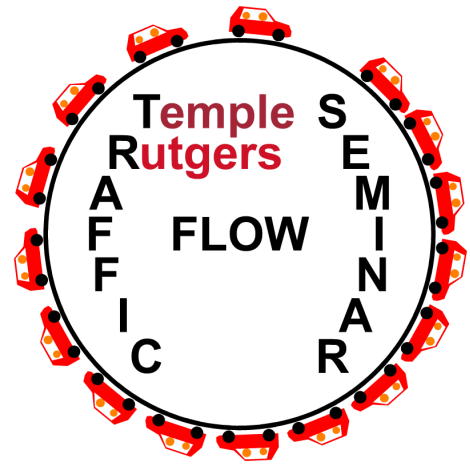# JOINT EVENT

TEMPLE UNIVERSITY
Department of Mathematics

Applied Mathematics and Scientific Computing Seminar

Room 617 Wachman Hall, Temple University

Wednesday, 8 April 2015, 4:00–5:00 p.m.

Computing in Time for Cyber-Physical Systems

by Jonathan Sprinkle

Electrical and Computer Engineering, University of Arizona

Abstract. Transforming physical systems into mathematical abstractions has a long history of success, but cyber-physical systems invalidate the assumptions that permit many of those abstractions. The development of a physical testbed of a CPS permits testing and system identification for researchers who are interested in specific platforms, but the interfaces through which these testbeds are sampled and controlled vary widely from application to application, even if the platform is the same. This talk discusses key issues of timescales over which control inputs execute, and how to develop novel controllers that can compute in time for the various models of execution used to predict future behavior. The talk includes examples of supervisory controllers used to prevent catastrophic loss of control or damage to a vehicle if intentionally dangerous inputs are provided, and examples where predictive controllers are used at varying timescales depending on the region of the state space in which the vehicle plans to operate at high/low speeds.