**GAIL WOLKOWICZ**, McMaster University

*Analysis of a simplified model of anaerobic digestion*

Anaerobic digestion is a complex naturally occurring process used for waste and wastewater treatment to produce bio-gas as a renewable source of energy. The so-called Anaerobic Digestion Model No. 1 (ADM1) includes 32 state variables and is not mathematically tractable. We analyze a simplified model proposed by Bornh oft, Hanke-Rauschenback, and Sundmacher, that seems to capture the qualitative dynamics of the ADM1 model, including the possibility of bi-stability and the bifurcation dynamics when substrate concentration is used as the bifurcation parameter. Our analysis applies to a general class of response functions. We then consider the effects of stochastic perturbations of the model using several different numerical schemes having different interpretations in an attempt to understand how to recognize and prevent imminent failure of the reactor. This is joint work with Tyler Meadows and Marion Weedermann.