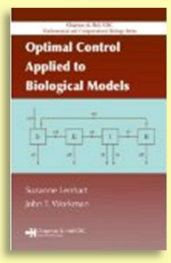
THE UNIVERSITY of NORTH CAROLINA
GREENSBORO

*Department of Mathematics & Statistics*

# Helen Barton Lecture Series in Mathematical Sciences




## Dr. Suzanne Lenhart

**Professor of Mathematics**

**University of Tennessee**


Suzanne Lenhart is a Chancellor's Professor of Mathematics the University of Tennessee, Knoxville, and is the Associate Director for Education and Outreach at the National Institute for Mathematical and Biological Synthesis (NIMBioS, funded by the National Science Foundation). She is currently also a Faculty Fellow of the University of Tennessee Center for Business and Economic Research and a member of the UT Center for Wildlife Health. She was a part-time member of the research staff at Oak Ridge National Laboratory for 22 years.

Dr. Lenhart is an applied mathematician working in partial differential equations, ordinary differential equations and optimal control. Her current research focuses on population models with applications in infectious diseases, invasive species, and natural resources

She has authored more than 140 journal articles, as well as 3 books, including *Optimal Control applied to Biological Models* and *Mathematics for the Life Sciences*. She was elected to the Board of Trustees of the Society for Industrial and Applied Mathematics (SIAM) in 2004 and again in 2007. She is a fellow of the American Mathematical Society, the American Association for the Advancement of Science and SIAM.

Dr. Lenhart has extensive education and outreach experience. She directed the Research Experiences for Undergraduates program in the Department of Mathematics for 15 years and now directs such a program at NIMBioS since 2009. She was President of the Association for Women in Mathematics (AWM) in 2001-2003. She has worked with the Bearden High School Math Club since 2002.

## The Power of Optimal Control in Biological Models

***Lecture 1:*** Introduction to Optimal Control of Ordinary Differential Equations

Monday, April 13, 2015
Reception: Lounge, Petty 116, 3:30-4:00 PM
Lecture: Petty 150, 4:00 PM

This talk will present the basic ideas underlying optimal control of ordinary differential equations. Source terms or rate coefficients in the differential equations are taken as control functions to be adjusted to achieve a specified goal. Following a simple case from Pontryagin's Maximum Principle, the technique for finding 'an optimal control' will be presented. Some illustrative examples will be shown.

***Lecture 2:*** Optimal Control of Systems of ODEs for Biological Systems

Tuesday, April 14, 2015
Reception: Lounge, Petty 116, 3:30-4:00 PM
Lecture: Petty 150, 4:00 PM

This talk extends the introduction of optimal control to systems of ODEs. Cases with the linear and nonlinear dependence on the controls will be compared. Examples of management strategies in infectious disease models will be shown.

***Lecture 3:*** The Power of Optimal Control in Discrete Models: from Confining Rabies to Improving CPR

Wednesday, April 15, 2015
Reception: Lounge, Petty 116, 3:30-4:00 PM
Lecture: Petty 150, 4:00 PM

This talk will present optimal control of discrete time models with two main examples. The first example involves difference equations that model cardiopulmonary resuscitation. The goal is to design an external chest and abdomen pressure pattern to improve the blood flow in the heart in standard CPR procedure. The second example is an epidemic model for rabies in raccoons on a spatial grid. The goal is to find the optimal distribution pattern for vaccine baits to slow the spread of the disease.

For more information, please see: http://www.uncg.edu/math/talks/index.html
or contact Dr. Maya Chhetri at maya@uncg.edu.