Fundamentals Methods of BioMathematics

**Instructor**: Majid Jaberi-Douraki

**Lecture Notes**:  
*Mathematical Modelling, A Graduate Textbook*, Seyed M. Moghadas and Majid Jaberi-Douraki

**Recommended reading**:  
*Introduction to Applied Nonlinear Dynamical Systems and Chaos, By Stephen Wiggins*  
*Nonlinear dynamics and chaos: with applications to physics, biology, chemistry, and engineering, By SH Strogatz*  
*Optimal control applied to biological models, By S Lenhart*

**Prerequisites**: Knowledge of differential equations

**Description**: Problems in computational science and physical and biological sciences have increasingly been utilizing sophisticated mathematical techniques. As a result, the gap between the mathematical sciences and other disciplines has heavily been bridged with recent development in the interdisciplinary field of mathematical biology. Our principal goal for this course is to teach students from mathematical and health sciences how to model their problems using dynamical sciences. The modeling is mostly done with continuous systems of ordinary and partial differential equations (ODEs and PDEs); however, they will be approximated using standard and nonstandard finite difference numerical techniques. The emphasis will be on fundamentals of mathematical modeling, i.e., model construction, continuous population models, models for interacting populations, and dynamics of infectious diseases.

For more details about the course, please contact Professor M. Jaberi-Douraki ([jaberi@vet.ksu.edu](mailto:jaberi@vet.ksu.edu))