A new course (designed for Spring 2009) in mathematical biology

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The purpose of the course is to introduce graduate students in mathematics, biology, and medicine to a new methodology which combines powerful mathematical methods with biological experiments. The course is structured as a collection of case studies of interesting biological problems, such as enzyme dynamics, autoimmune diseases, cancer, wound healing, plant growth, etc. In each of these topics a specific problem will be posed, and a mathematical model and relevant mathematical methods will be developed to analyze the biological problem. Students will proceed to validate the model by simulating it and then comparing the numerical results with known experimental results. Once the model has been validated, the students will be asked to use the model in order to propose new biological hypotheses and new experiments.

The course is designed so that the mathematical methods will be introduced in a gradual manner. The aim of the course is

- (1) to develop mathematical and computational tools to address biological problems
- (2) to demonstrate that such tools can indeed be very useful to biologists, and can decrease the need to rely on experiments
- (3) to open new challenges and opportunities to mathematical students who are interested in solving real-world problems in general, and biosciences problems in particular