DESCRIPTION: The revolution in molecular biology and genetics has begun to penetrate even the conservative world of medicine. New methods are increasingly quantitative, meaning that physicians, students in the biomedical sciences, and citizens without quantitative training are less and less able to understand and evaluate choices of treatment. This course will develop a series of detailed case studies where mathematics has played a fundamental role in improving medical care. Each week we’ll learn the physiology underlying the medical problem and show how quantitative methods have changed practice. Mathematical methods will be taught from the ground up, simulated on the computer, and used to evaluate therapies and control measures.

PREREQUISITES: This course works best with a mixture of students with different expertise, some with more advanced mathematics (advanced calculus or differential equations) and some with more advanced biology (cell biology, some medical experience). If you are interested, but worried you don’t have the background, get in touch because motivation and curiosity are more important. All students require permission of the instructor.

GRADING: Based on homework and computer labs, but primarily on writing about readings from the primary literature, leading a class discussion, and a research project.

EXAMPLES OF SPECIFIC APPLICATIONS
1. Should we test only high risk groups for rare diseases?
2. What are the most effective vaccination strategies?
3. Does breast-cancer testing save lives or just increase treatment?
4. Why do we use triple drug therapy for HIV?
5. Who are the best patients to list for transplantation?
6. What are the best ways to control sexually-transmitted diseases?
7. How can we control the evolution of antibiotic resistance?
8. How can we manage the evolution of resistance to Gleevec in leukemia?

PRACTICALITIES
Time: TH 12:25–1:45 p.m.
Place: LS 101
Catalog number: Math 3600, Biol 3400, or Biol 5400
Class number: 16724
Credit hours: 3
Instructor: Prof. Fred Adler
email: adler@math.utah.edu

Web page: http://www.math.utah.edu/~adler/math3600/