A major focus of the course will be using mathematical models to attempt to answer the following eight questions about HIV/AIDS:

1. What causes the viral load of untreated HIV patients to decrease sharply by the end of approximately 90 days after infection?
2. How much viral reproduction occurs during the ~8 year latent period in untreated HIV patients?
3. What are the lifetimes of healthy cells, HIV infected cells, and virions in untreated patients during multi-year latent phase? What is the burst size of the HIV virus?
4. When is an HIV/AIDS patient most infectious?
5. Why does single drug therapy for HIV fail after a relatively short time?
6. Is there a correlation between the rate of exponential growth of virus replication during the first week and the (set-point) equilibrium viral load?
7. Are the mutations that result in HIV drug resistance present before drug therapy begins or are they generated during drug treatment?
8. In almost every real-world example of an epidemic caused by an infectious disease, initially, the number of new cases grows exponentially. Why were the numbers of AIDS-infected patients growing cubically at the onset of the epidemic in the US?