

Bevier Public Health Initiative Proposal
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Proposal I propose to add a unit (1-2 weeks) on the spread of disease to my mathematical models and applications course (MAT 325, offered Spring 2008 and alternate years). Models are particularly important for public health because they allow us to make cost-benefit analyses (for example, to determine whether it's worth instituting an expensive inoculation program for a disease that's easy to treat). In the past, the course has included a day or two on a differential equations model (the susceptible-infected-recovered, or SIR, model), and I plan to go into more detail next time. In addition, I plan to add discussion of another model, a stochastic (or probabilistic) model, which, unlike the differential equations model, takes into account the randomness involved in a disease outbreak. In each case, parameters in the model reflect the contagiousness and lethality of the disease, the incubation time, the proportion of people immunized, etc. It will be especially useful to compare the two models against each other and against actual data (for example, from the 2003 SARS outbreak, or measles cases in New York City over the last 80 years). After completing the unit, students should have an understanding of the way diseases can spread (locally, nationally, and globally) and of the effectiveness of different kinds of intervention (prevention, immunization, quarantine, treatment, etc.).

Timeline I plan to spend the first two weeks of August preparing the unit (researching and adapting existing models, comparing to exist data, preparing lectures, and constructing projects and assignments). The most time-consuming part may end up being the selection of appropriate parameter values; there are many parameters involved in the models, and I'll need to pick them so that the models roughly match each other and the data, but still exhibit interesting differences, and that process usually involves a lot of trial and error.

Previous Grants In collaboration with Amber Garcia (in psychology, now at the College of Wooster), I received a \$4000 grant for the Center for Teaching and Learning for our project "Women in Math and Science: Examining Psychological Barriers to Learning." I will present a report in the CTL in April. The project is ongoing, and we intend to submit it for publication in a psychology journal.

Budget 2 weeks x \$500/week = \$1000