

Math 056
Mathematical Modeling with Applications in Biology
Fall 2009

Class: Tuesdays and Thursdays, 11:20-12:35pm, Science Center L32

Instructor: Professor Sarah Hews

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Office Hours: Martin 207: Tuesdays and Thursdays, 12:45-2pm, and by appointment

Course Description: The course will start with linear and nonlinear difference equations followed by continuous models that include systems of differential equations. Model development, analysis techniques, and model interpretations will be studied. Extended time will be spent on the Nicholson-Bailey Model, the Droop equation, Perelson's HIV model, the Lotka-Volterra equations, and Scheffer's turbidity of lakes bistability model.

Prerequisites: Math 027/028 and Math 034/035 or permission of instructor.

Text: *Edelstein-Keshet*. Mathematical Models in Biology. Siam. 2005. Available at the bookstore.

Supplementary Materials: The following will be posted on the course website and are considered required reading material for the course.

Perelson, A.S., Neumann, A.U., Markowitz, M., Leonard, J.M. , and Ho, D.D. HIV-1 dynamics *in vivo*: virion clearance rate, infected cell life-span, and viral generation time. *Science*, 271, 1582-1586.

Scheffer, M., Hosper, S.H., Meijer, M-L., Moss, B., and Jeppesen, E (1993). Alternative Equilibria in Shallow Lakes. *Tree*, 8(8), 275-278.

Homework: Homework sets will be due every Tuesday at the beginning of class. No late homework will be accepted.

Exams: There will be 2 midterms and a Final. Dates TBD.

Grading: The final course grade will be determined by:

Homework/participation: 25%

First exam: 20%

Second exam: 20%

Final exam: 35%
