

Fall 2014 Course Announcement
MTH 499

An introduction to mathematical modeling in biology

Course description: Currently biology is undergoing a transformation, similar to what happened to physics and engineering in the past few centuries. A key feature in this process is the attempt to make biology a more quantitative science. Mathematics has always been the language in which scientific ideas can be expressed in a precise, quantitative way, and it is therefore not surprising that mathematics is playing an important role in the ongoing transformation of biology.

In this course we will focus in particular on how to model various biological systems using mathematical models of different forms -ordinary and partial differential equations, discrete dynamical systems, and as stochastic processes. We will learn how to analyze these models using certain mathematical techniques. This will lead to a better understanding of the behavior of the models, which in turn informs us about the biological processes under investigation.

No background in biology is necessary, but students should have passed MTH 256 and MTH 341 or MTH 342. We will cover a wide range of biological scales: from the very small (such as genetic networks), to the very large (population biology and ecology). Each topic will be guided by a fundamental biological question. Some examples: How do bacteria compete for resources, and can we predict the winner? How does a disease spread in a population? How does it spread in an individual? Can we control it? Eradicate it? How does natural selection work? How do cells, species, animals move?

Course meets MWF 1500-1550 in BAT 250. CRN 20004

Successful completion of this course counts in partial fulfillment of the free elective requirement in the math major and the upper division requirement in the math minor.

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Contact the instructor for further information and see your advisor to request an override to enroll.