

MATH 591

Mathematical Models in Biology and Medicine

Class #: 12238

Class Schedule: MWF 10:00—10:50am

Room: NS 130

Instructor	Dr. Jiaxu Li	Office	NS 224
Office Phone	502-852-6828	Office Hours	MW 1:30—3:00pm or by appointment
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Text **MATHEMATICAL MODELS IN BIOLOGY** by Leah Edelstein.
SIAM Classics in Applied Mathematics 46 2004 | <http://ec-securehost.com/SIAM/CL46.html>

The aim of this book is to present instances of interaction between two major disciplines, biology and mathematics. The goal has been that of addressing a wide audience. Biology students will find this text useful as a summary of mathematical methods used in modeling, and applied mathematics students may benefit from examples of applications of mathematics to real life problems. Undergraduate students, beginning graduate students, will find most of the material accessible and engaging.

References -- **Differential Equations, Dynamical Systems & An Introduction to Chaos**, second edition, by Hirsch, Smale, Devaney
-- **Mathematical Physiology** by James Keener and James Sneyd
-- Some research papers provided by the instructor

Objectives If you are concerned with the population growth, the molecular events under the physiological mechanisms, diseases like diabetes, and alarming rate of species extinction and ultimately hopes for the future, you may find mathematical help in this course. The main objective of this course is to construct and study plausible mathematical models (ordinary differential equation models) addressing current issues in biosciences. Computer simulation methods and programs in Matlab will be introduced and emphasized.

Tentative Schedule After brief preparations on the stability theory and phase plane analysis of ordinary differential equations, this class will cover most of the part II in the text, and additional selective references. Appropriate literatures will be assigned to students for reading when needed.

Prerequisites MAT 405 (Differential Equations), or upon instructor's approval. Students without taking MAT 405 and MAT 325 (Linear Algebra) but with strong calculus background are encouraged to enroll.

Grading Four or five sets of assignments = 200 points
One project or one Final exam = 100 points

85-100% = A, 70-84% = B, 60-69% = C, 45-59% = D, <45% = F.

Except in the case of a documented emergency, late assignments will not be accepted.

Students with Disabilities The university of Louisville is committed to providing access to programs and services for qualified students with disabilities. If you are a student with a disability and require accommodation to participate in and complete requirements for a class, contact the Disability Resource Center (Robbins Hall, 852-6938) for verification of eligibility and determination of specific accommodation.

The instructor reserves the right to make changes in the syllabus when necessary to meet learning objectives, to compensate for missed classes, or for similar reasons.