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M 414.01: Deterministic Models

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SYLLABUS: MATH 414
DETERMINISTIC MODELS
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Time and Place: MWF 1:10pm, Room 306, Math Building.
Text: de Vries, Hillen, Lewis, Müller, Schönhöfisch, *A Course in Mathematical Biology: Quan-
Prerequisite: Math 311, Ordinary Differential Equations, Math 221, Linear Algebra
Office Hours: MWF 2:10pm. Feel free to stop by other times or call/email for an appoint-
ment.

OVERVIEW: Difference equations (DEs), ordinary differential equations (ODEs), mod-
eling with DEs and ODEs, optimization and statistical methods for parameter estimation. We will follow the book closely, though we will discuss the statistical method called bootstrap.

LEARNING GOALS:

1. to learn to model biological phenomena with difference equations and ordinary and
   partial differential equations.

2. to learn to analyze these models: stability, phase-plane analysis, oscillatory behavior,
   limit cycles, and chaos.

3. to learn how to numerically solve ODEs and how to fit DE and ODE models to data.

ASSESSMENT: Your course grade will be determined by your performance on the home-
work and a final project, but also by a possible exam.

HOMEWORK, EXAM, PROJECT: Homework will be given roughly every 4th class
period. Any exam will be meant to mimic the MS/PhD prelim exam given in our depart-
ment. Projects will be given in groups during the last week or two of the semester, with
final presentations given during finals week.

FOR ANY STUDENT WITH A DISABILITY: If you have a disability that has,
or might have, an effect on your performance in this class, please let me know. I will do my
best to accommodate you.

Important Dates:

Feb. 4 Last day to drop/add on CyberBear.
Feb. 14 Last day to change grade option.
April 7 Last day to drop without Dean’s signature.
May 14 Final Presentations, Wednesday, 3:20 am - 5:20pm.