

APPLIED MATHEMATICS
for
ENVIRONMENTAL SCIENCE
Instructor: H.M. Haitjema (haitjema@indiana.edu)
Fall 2004

Location: room PV277 (class) and room PV273 (recitation sessions)

Time: TR 11:15 a.m.–12:30 p.m. (class) and R 5:30–7:30 p.m or 7:30–9:30 p.m. (recitation session)

Course number: E526 section 10816 (rec. sessions 10817 & 10818)

Office hours: TR 9:30-10:30 a.m. and by appointment, room SPEA 439

Secretary: Genia Marvin (855-0563)

Teaching Assistants: Megan Hill (instructor), office hours none
email: mmhill@indiana.edu

Brian Hattenbach (tutor), office hours MW 4:00-5:30 pm. and
TR 4:30-5:30 pm. in room 271, email: bhattenb@indiana.edu

Class text: Applied Mathematics for Environmental Science (class notes) on Oncourse.

Course Description

The first part of the course is a review of basic calculus with an emphasis on solving “story problems”. The remainder of the course is devoted to applying mathematical techniques to environmental science problems. Topics include: ordinary differential equations, systems of equations, and an introduction to partial differential equations. Both analytical and numerical solution techniques will be discussed.

Course Objectives

To demonstrate the usefulness of mathematics (especially calculus) as a tool for understanding environmental phenomena. Related to this are providing proficiency in writing, manipulating, and interpreting mathematical models of environmental processes.

Course Grading

<i>Midterm I</i>	(25%)	Thursday, October 7,	5:30–7:30 or 7:30–9:30 p.m.
<i>Midterm II</i>	(25%)	Thursday, November 11,	5:30–7:30 or 7:30–9:30 p.m.
<i>Final exam</i>	(30%)	Tuesday, December 14,	in class 1:00 - 3:00 pm.
<i>Homework</i>	(20%)	assigned weekly.	

COURSE OUTLINE

week	subject	pages
1	Introduction, Review of algebra, Story problems	1 - 18
2	Differentiation	19 - 25
3	Series expansions	26 - 31
4	Integration	31 - 39
5	Ordinary Differential Equations (ODE)	39 - 45
6	ODE, Asymptotic behavior, Midterm I	45 - 47
7	Numerical Methods, exam debriefing	47 - 50
8	Numerical solutions to ODE, Root finding	50 - 57
9	Second order ODE	57 - 64
10	Vectors and Tensors (selections)	65 - 80
11	Total and Partial Derivatives, Midterm II	80 - 84
12	Partial Differential Equations (PDE)	84 - 88
13	Demo Chaos, Thanksgiving	–
14	Schmidt's graphical method	89 - 92
15	Systems of equations, review	92 - 97
16	Final exam	...