Department of Mathematics
Pomona College

Course Outline for Mathematics 102
Differential Equations and Modeling
Spring 2015

Time	MWF 10:00 am - 10:50 am
Place:	SC Room 102 (Seaver Commons Area)
Instructor:	Dr. Adolfo J. Rumbos
Office:	Mudd Science Library 106.
Phone/e-mail:	ext. 18713 / arumbos@pomona.edu
Courses Website:	**http://pages.pomona.edu/~ajr04747/**
Office Hours:	MWF 9:00 am - 9:50 am, TR 9:00 am – 10:00 am, or by appointment
Text:	*Differential Equations* by Paul Blanchard, Robert L. Devaney and Glen R. Hall. Publisher: Cengage Learning.
Prerequisites:	Linear Algebra and Multivariable Calculus

Course Description. This course is an introduction to the modern qualitative theory of ordinary differential equations and its various applications to modeling physical and biological phenomena. Emphasis will be placed in the modeling aspects of differential equations. A solid knowledge of Linear Algebra will be presupposed. The course topics are listed on the attached tentative schedule of lectures and examinations.

Assigned Readings and Problems. Readings and problem sets will be assigned at every lecture. Homework assignments will be collected on an alternate basis. Students are strongly encouraged to work on every assigned problem. **Late homework assignments will not be graded**.

Grading Policy. Grades will be based on the homework, three 50-minute examinations, plus a comprehensive final examination. The overall score will be computed as follows:

homework	20%
three 50-minute exams	50%
final examination	30%

Final Examination.

Time: Monday, May 11 9:00 am - 11:00 am.
Place: SC Room 102

Math 102 **Spring 2015**

Tentative Schedule of Lectures and Examinations

Date		Topic
W	Jan. 21	Introduction to Modeling: The Chemostat System
F	Jan. 23	Differential Equations
M	Jan. 26	Qualitative analysis of the logistic equation
W	Jan. 28	Analytical technique: separation of variables
F	Jan. 30	Basic theory: existence, uniqueness, and extendibility
M	Feb. 2	Existence and uniqueness (continued)
W	Feb. 4	Existence and uniqueness (continued)
F	Feb. 6	Slope fields and Euler's method
M	Feb. 9	Slope fields (continued)
W	Feb. 11	Predator-prey systems
F	Feb. 13	Systems (continued)
M	Feb. 16	Review
W	Feb. 18	**Exam 1**
F	Feb. 20	Qualitative analysis: equilibrium points and stability
M	Feb. 23	Equilibrium points and stability (continued)
W	Feb. 25	Nullcline analysis
F	Feb. 27	Phase-Plane Analysis
M	Mar. 2	Two-species models
W	Mar. 4	Two-species models (continued)
F	Mar. 6	Two-species models (continued)
M	Mar. 9	The derivative of a function
W	Mar. 11	The derivative of a function (continued)
F	Mar. 13	Problems
M	Mar. 16	*Spring Recess!*
W	Mar. 18	*Spring Recess!*
F	Mar. 20	*Spring Recess!*

Date		Topic
M	Mar. 23	Systems revisited (linear and nonlinear)
W	Mar. 25	Existence and uniqueness
F	Mar. 27	*Cesar Chavez Day*
M	Mar. 30	Review
W	Apr. 1	**Exam 2**
F	Apr. 3	Linear systems
M	Apr. 6	The structure of the set of solutions of linear systems
W	Apr. 8	Nonlinear systems
F	Apr. 10	Linearized stability
M	Apr. 13	Linearized stability (continued)
W	Apr. 15	Two-dimensional systems
F	Apr. 17	Two-dimensional systems (continued)
M	Apr. 20	Applications to mechanics: linear and nonlinear oscillations
W	Apr. 22	linear and nonlinear oscillations (continued)
F	Apr. 24	Problems
M	Apr. 27	Review
W	Apr. 29	**Exam 3**
F	May 1	Review
M	May 4	Review
W	May 6	Review
M	May 11	**Final Examination at 9 am**