Department of Mathematics
Pomona College

Course Outline for Mathematics 102
Differential Equations and Modeling
Spring 2017

Time	MWF 11:00 AM - 11:50 AM
Place:	Millikan Room 1249
Instructor:	Dr. Adolfo J. Rumbos
Office:	Andrew 2287.
Phone/e-mail:	ext. 18713 / arumbos@pomona.edu
Courses Website:	**http://pages.pomona.edu/~ajr04747/**
Office Hours:	MWF 10:00 am - 10:50 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 8 9:00 am - 11:00 am.
Place: Millikan Room 1249

Math 102 **Spring 2017**

Tentative Schedule of Lectures and Examinations

Date		Topic
W	Jan. 18	Introduction to Modeling: The Chemostat System
F	Jan. 20	The Chemostat System (continued)
M	Jan. 23	Differential equations
W	Jan. 25	Linear systems of differential equations
F	Jan. 27	Solving linear systems
M	Jan. 30	Solving diagonal linear systems: Separation of variables
W	Feb. 1	Solving non-diagonal linear systems: Integrating factors.
F	Feb. 3	Solving diagonalizable systems
M	Feb. 6	Solving non-diagonalizable systems
W	Feb. 8	Existence and uniqueness theory for linear systems
F	Feb. 10	Existence and uniqueness theory (continued)
M	Feb. 13	Review
W	Feb. 15	**Exam 1**
F	Feb. 17	General systems of differential equations
M	Feb. 20	Existence and uniqueness
W	Feb. 22	Existence and uniqueness (continued)
F	Feb. 24	Global existence
M	Feb. 27	Analysis of general systems of differential equations
W	Mar. 1	Qualitative analysis: equilibrium solutions and stability
F	Mar. 3	Qualitative analysi (continued)
M	Mar. 6	Qualitative analysis: Nullclines
W	Mar. 8	Principle of linearized stability
F	Mar. 10	Principle of linearized stability (continued)
M	Mar. 13	*Spring Recess!*
W	Mar. 15	*Spring Recess!*
F	Mar. 17	*Spring Recess!*

Date		Topic
M	Mar. 20	Review
W	Mar. 22	**Exam 2**
F	Mar. 24	Analysis of models
M	Mar. 27	Analysis of models: nondimensionalization
W	Mar. 29	Nondimensionalization (continued)
F	Mar. 31	*Cesar Chavez Day*
M	Apr. 3	Qualitative analysis of first-order differential equations
W	Apr. 5	Qualitative analysis of second-order differential equations
F	Apr. 7	Qualitative analysis of second-order differential equations (continued)
M	Apr. 10	Conservative systems
W	Apr. 12	Conservative systems (continued)
F	Apr. 14	Dissipative systems
M	Apr. 17	Dissipative systems (continued)
W	Apr. 19	Gradient systems
F	Apr. 21	Gradient systems (continued)
M	Apr. 24	Review
W	Apr. 26	**Exam 3**
F	Apr, 28	Review
M	May 1	Review
W	May 3	Review
M	May 8	**Final Examination at 9 am**