

Math 5A, Fall 2011
Differential Equations and Linear Algebra
Tuesday & Thursday, 3:30 pm-4:45 pm., BRDA 1610

Instructor: Gustavo Ponce.

Office: South Hall, 6505.

Phone: 893-8365.

E-mail: ponce@math.ucsb.edu

URL: <http://www.math.ucsb.edu/~ponce>

Office Hours: Wednesday & Thursday 5 pm-6:30 pm.

Teaching Assistant: Rob Ackermann (SH6431K), Tomas Kabbabe (SH 6432N), and Rick Spjut (SH 6432Q).

Office Hours: RA (T. 2-3 pm), TK (F 2-3 pm), and RS (M. 9-10 am)

Textbook: *Differential Equations and Linear Algebra*, by J. Farlow, J. E. Hall, J. M. McDill, and B. H. West.

Course description: This is primarily a course on second-order differential equations and systems of first-order differential equations, together with some introductory linear algebra.

Prerequisites: A grade of **at least a C** in Math 3C or 7C.

Assignments and grading: Homework (on webwork) will be assigned on Tuesdays. **Late homework will not be accepted.**

There will be a midterm (**NOV. 3 in class**) and a final exam (**DEC. 08 from 4-7 pm**) .

Your final grade for the course will be decided according to the following formula:

Final Grade =

15% HW + 15% dis. session + 20% Midterm NOV. 3 + 50% Final DEC. 08

YOU HAVE TO GET ABOVE (50%) IN THE FINAL TO PASS THE CLASS.

Syllabus: During this course we will try to follow the following schedule.

Week 1: Second Order Linear Differential Equations.

1. The Harmonic Oscillator.
2. Real Characteristic Roots.
3. Complex Characteristic Roots.

Week 2: Second Order Linear Differential Equations.

1. Undetermined Coefficients.

2. Variation of Parameters.

3. Forced Oscillations.

Week 3: Linear Transformations.

1. Conservation and Conversion.

2. Linear Transformations.

Week 4: Linear Transformations.

1. Properties of Linear Transformations.

2. Eigenvalues and Eigenvectors.

Week 5: Linear Transformations.

1. Eigenvalues and Eigenvectors (cont.).

2. Coordinates and Diagonalization.

Week 6: Linear Systems of Differential Equations.

1. **Midterm Exam.**

2. Theory of Linear Differential Equations.

3. Real Systems with Real Eigenvalues.

Week 7: Linear Systems of Differential Equations.

1. Linear Systems with Non-Real Eigenvalues.

2. Stability and Linear Classification.

3. Decoupling a Linear System of Differential Equations.

Week 8: Matrix Exponential.

1. Matrix Exponential.

2. Nonhomogeneous Linear Systems.

Week 9: Nonlinear Systems of Differential Equations.

1. Nonhomogeneous Linear Systems (cont.).

2. Nonlinear Systems.

Week 10: Nonlinear Systems of Differential Equations.

1. Nonlinear Systems (cont.).

2. Linearization.