

MATH 37A: Differential Equations
Summer 2018

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Office hours: TBD

Text. *Differential Equations*, P. Blanchard, R. Devanney, and G. Hall, 4th edition.

Exams. There will be one midterm exam and one final exam.

- Midterm: TBD.
- Final Exam: TBD.

If you have an academic conflict (such as a class, lab, or another exam) with a midterm, inform your instructor **at least one week before the exam**. If the conflict can't be resolved, we will offer you a make-up exam.

Grades. Your grade in the course will be based on the following:

(1) **Homework (40% of your grade)**

- Homework assignments will be collected once or twice a week.
- **No late homework will be accepted.**
- We encourage you to discuss homework problems with your classmates, but you must write up your own solutions. **You may not use any solution manuals.**

(3) **Midterm (30% of your grade)**

(4) **Final exam (30% of your grade)**

Calculators. You should have access to a scientific calculator (an online one is OK). Calculators are **not** allowed during exams. You do not need a graphing calculator.

LATTE. All course materials for Math 37A will be available online on LATTE. Log in at <http://latte.brandeis.edu> using your Unet username and password.

Office hours. You are encouraged to use your instructor's office hours whenever you have questions about the course material. If you can't attend office hours, don't hesitate to ask for an appointment at another time.

Four-Credit Course. Success in this 4 credit hour course is based on the expectation that students will spend a minimum of 9 hours of study time per week in preparation for class (readings, papers, discussion sections, preparation for exams, etc).

Students with disabilities. If you are a student with a document disability and wish to have a reasonable accomodation made for use in this class, please contact me immediately.

Academic Integrity. You are expected to follow the University's policy on academic integrity, which is distributed annually as Section 4 of the Rights and Responsibilities Handbook (see <http://www.brandeis.edu/studentaffairs/srcs/rr/index.html>). Instances of alleged dishonesty will be forwarded to the Department of Student Development and Conduct for possible referral to the Student Judicial System. Potential sanctions include failure in the course and suspension from the University. If you have any questions about how these policies apply to your conduct in this course, please ask.

Learning Goals. Related problems covered in this course can be solved, and slightly deeper materials in ODE can be learnt based on the understanding in the following topics.

Topics covered in Math 37A (Differential Equations)

Order may change

Section 1.1	Modeling via Differential Equations
Section 1.2	Separation of Variables
Section 1.3	Slope Fields
Section 1.4	Euler's Method
Section 1.5	Existence and Uniqueness of Solutions
Section 1.6	Equilibria and Phase Line
Section 1.7	Bifurcations
Section 1.8	Linear Equations
Section 1.9	Integrating Factors
Section 2.1	Modeling via Systems
Section 2.2	Geometry of Systems
Section 2.3	Damped Harmonic Oscillator
Section 2.5	Euler's Method for Systems
Section 2.6	Existence and Uniqueness for Systems
Section 2.7	Lorenz Equations
Section 3.1	Linearity Principle
Section 3.2	Straight Line Solutions
Section 3.3	Phase Portraits
Section 3.4	Complex Eigenvalues
Section 3.5	Repeated and Zero Eigenvalues
Section 3.6	Second-Order Linear Equations
Section 3.7	The Trace-Determinant Plane
Section 3.8	Linear Systems in Three Dimensions
Section 4.1	Force Harmonic Oscillators
Section 4.2	Sinusoidal Forcing
Section 4.3	Undamped Forcing and Resonance
Section 4.4	Amplitude and Phase of the Steady State
Section 4.5	The Tacoma Narrows Bridge
Section 5.1	Equilibrium Point Analysis
Section 5.2	Qualitative Analysis
Section 5.3	Hamiltonian Systems
Section 6.1	Laplace Transforms
Section 6.2	Discontinuous Functions
Section 6.3	Second-Order Equations
Section 6.4	Delta Functions and Impulse Forcing
Section 6.5	Convolutions