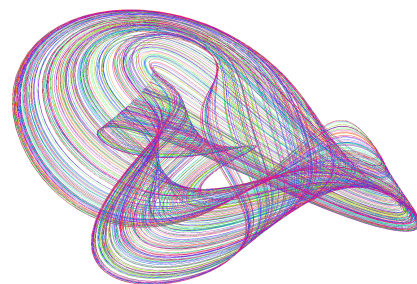


Class Time: MWF 9:00 - 9:50 am
Lecture Room: Friedman Hall 003
Instructor: Jason Bramburger, jason_bramburger@brown.edu
Office: 170 Hope Street, Room 206
Office Hours: T 11:00 am - 2:00 pm, or by appointment
Course Website: Canvas



Course Objectives and Learning Goals

This course gives an overview of the theory and applications of dynamical systems modeled by differential equations and maps. We will discuss changes of the dynamics when parameters are varied, investigate periodic and homoclinic solutions that arise in applications, and study the impact of additional structures such as time reversibility and conserved quantities on the dynamics. We will also study systems with complicated "chaotic" dynamics that possess attracting sets which do not have an integer dimension. Applications to chemical reactions, climate, epidemiology, and phase transitions will be discussed.

By the end of the course, you will

- have intuition into the dynamics of planar differential equations;
- be able to extract and sketch dynamical features of differential equations in two and three dimensions;
- be able to predict qualitative changes in the dynamics of mathematical models triggered by parameter changes;
- be able to interpret solutions to mathematical models in the original context.

Textbook

There is no required textbook, but the following is a list of resources that will complement the course material:

- *Nonlinear Dynamics and Chaos*, Steven Strogatz, Westview Press.
- *Differential Dynamical Systems*, James Meiss, SIAM (available for free)

Prerequisites: APMA 0350 and MATH 0520/0540

Time Expectations

Class time (8 hours/week)	39	hours
Reviewing Class (2 hours/week)	26	hours
Homework (4 hours/week)	52	hours
Midterms (7 hours/midterm)	14	hours
Final Project and Presentation	45	hours
Total	176	hours

Assessment

Homework	25%
Midterm Exam 1	20%
Midterm Exam 2	20%
Final Project	30%
Presentation	5%

Homework

Assignments will be available on Canvas every Wednesday, and are due the following Wednesday at the *beginning*

of class (9:00 am). Late assignments will not be accepted without a legitimate excuse and prior approval. Students are encouraged to collaborate on homework assignments, but assignments must be written up separately and individually. Homework assignments must take the form of a single, *stapled* package with your name and neatly written (or typed) solutions labeled with problem numbers. Solutions must show all work, not just the final answer. Assignments that do not meet these requirements will be subject to point deductions.

Midterms

Midterm exams will be given in class, using the full time slot. Midterms will not be given at any other times than these scheduled times, except in cases of illness or emergency. If a serious conflict arises, you need to contact me as soon as possible prior to the midterm, and documentation verifying the excuse will be required.

Anticipated Grading Scale

A	90-100%
B	80-89%
C	70-79%

Grading scale is subject to change. However, the minimum grade cutoffs will not be raised.

Class Time

You are *highly* encouraged to attend all classes. The summer course schedule is fast-paced, and missing even 2 classes corresponds to missing over a week of material covered during the regular fall/spring semesters. I am required to take and report daily class attendance. Class time will include lectures and active learning problem-based sessions, and will give you the opportunity to implement the material first hand. Math is best learned by doing! The problem-based sessions will enhance conceptual understanding of the material, and promote effective communication skills.

Accommodations for Students with Disabilities

If you need accommodations for classes, assignments, or exams, please contact me and Student and Employee Accessibility Services. Website: <https://www.brown.edu/campus-life/support/accessibility-services/>.

Diversity and Inclusion Statement

I strive to create a learning environment for you that supports a diversity of thoughts, perspectives, and experiences, and honours your identities. To help accomplish this:

- If you have a name and/or set of pronouns that differ from those that appear in your official Brown records, you are encouraged to let me know.
- If you feel your performance in the course is being impacted by your experiences outside of class, please come talk with me.
- I am still in the process of learning about inclusion, diverse perspectives, and identities. If something was said in class (by anyone, including me) that made you feel uncomfortable, please talk to me about it.
- As a participant in course discussion and problem-based sessions, you should strive to honour the diversity of your classmates.

Additional Course Policies

- No cell phones or computers allowed during class time.
- All announcements will be posted on the Canvas webpage. Be sure your Canvas notifications are turned on, and you check the webpage periodically.
- I am here to facilitate your learning; let me know if you have questions! I can always be reached by e-mail, and can schedule additional office hours.

Anonymous feedback: [You can provide anonymous feedback for this class here.](#)