

Chaos

Course Number: PHYS217
Instructor: Christina Othon
Office Hours: Monday 9-10:30 AM; Wednesday 2:30-4:00, Feel free to drop in any other time that my door is open.
Course Course Assistant: Paul Hanakata, phanakata@wesleyan.edu
CA Hours: Tuesday 8:30-9:30 PM Science Center 216
E-mail: cothon@wesleyan.edu
Schedule: 11:00-11:50 M, W, F
Office: #233, Science Tower
Course Website: On Moodle
Telephone: 685-2107

This course in Chaos will develop a fundamental appreciation of chaotic dynamics based primarily on computational investigation of theoretical principles:

- *Phase Space*
- *Poincare Sections*
- *Attraction*
- *Bifurcation*
- *Lyapunov Exponents*

It is the policy of Wesleyan University to provide reasonable accommodations to students with documented disabilities. Students, however, are responsible for registering with Disabilities Services, in addition to making requests known to me in a timely manner. If you require accommodations in this class, please make an appointment with me as soon as possible [during the nth week of the semester], so that appropriate arrangements can be made. The procedures for registering with Disabilities Services can be found at <http://www.wesleyan.edu/deans/disability-students.html>.

Course Prerequisites: Students should have previously taken Introductory Physics with calculus.

Required Text: *Chaotic Dynamics*, by G.L. Baker and J.P. Gollub, Cambridge University Press, and *Chaos*, by James Gleick, Penguin

Homework: Homework will be assigned weekly, and will be due at the end of the day on Wednesday. Paul Hanakata is the course CA. He can also be visited at his SCIC tutoring hours <http://www.wesleyan.edu/scic/services/tutoring.html>

Exam: There will be one in-class exam given in the final week of the course, which will be the equivalent of one homework assignment.

Grading: Grades are based on the total number of points earned on homework and the exam, with an added bias for class participation. Your course grade will be computed as follows.

Homework and Class Participation:	80%
In-Class Exam:	20%

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Date	Day	Topic	Reading
22-Oct	Mon	Intro to Chaos & Dynamics	
24-Oct	Wed	Differential Equations, Stability Pts	BG1
26-Oct	Fri	Flow and Euler Method	BG p. 1-21; Gleick 2
29-Oct	Mon	Mathematica Primer	BG2
31-Oct	Wed	Phase Space	BG2
2-Nov	Fri	Phase Space	BG2
5-Nov	Mon	Poincare Maps	BG2; Gleick 5
7-Nov	Wed	Damped Harmonic Oscillator	BG2
9-Nov	Fri	Driven Pendulum	BG3
12-Nov	Mon	Bifurcations	BG3; Gleick 8
14-Nov	Wed	Bifurcations	BG3
16-Nov	Fri	Driven Pendulum	BG3
19-Nov	Mon	Lyapunov Exponents	BG4; Gleick 11
21-Nov	Wed	--- Break ---	BG4
23-Nov	Fri	---Break---	
26-Nov	Mon	Logistic Map;	
28-Nov	Wed	Difference Equations	BG4
30-Nov	Fri	Universal Structure in Chaos	BG4
3-Dec	Mon	Chaotic Attractors	BG5
5-Dec	Wed	Fractals	BG5
7-Dec	Fri	Lyapunov Exponents	BG5
12-Dec	Wed	Final Exam	