

# MAT 351

## Differential Equations: Dynamical Systems and Chaos

**MWF 10:40-11:35 SB Union 237**

**Instructor** [Araceli M. Bonifant](#)

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**Office Hours:** Monday, Wednesday 11:35 -12:35 pm, or by appointment

**Textbook:** An Introduction to Chaotic Dynamical Systems, Second Edition by Robert Devaney, Addison Wesley.

**About the course:** The aim of this course is to introduce the students into the mathematical field of dynamical systems.

We will study hyperbolicity, symbolic dynamics, topological conjugacy, structural stability and chaos.

This course will be a rigorous mathematics course where students will be required to understand all of the definitions, theorems, proofs and so forth. Students will often be asked to explain mathematical concepts in essay questions on exams and quizzes to prove certain facts, and to write concisely and accurately about the mathematical ideas of the course.

During the semester students will be required to develop some projects. The objective of these projects is to help students to understand better the material covered in class, expand their knowledge of certain areas, get new examples, etc. If the project consists of reading some paper, the student will be required to write a report of such paper. Students could also be asked to explain the paper in class.

A tentative [syllabus](#) will be updated according to the progress of the class.

**Prerequisites:** MAT 351 is an undergraduate level course designed for students who have already taken MAT 203 or 205 or AMS 261; MAT 303 or 305 or AMS 361: MAT 200 or permission of the instructor.

### Grading Policy:

Your grade will be determined by your scores on

- Midterm : 25%
- Final : 35%
- Quizzes : 20%
- Projects : 20%

**Homework:** Homework will be assigned weekly but not collected or graded. However the weekly quiz it may based on some of the homework assignments.

**Quizzes** There will be weekly quizzes every Friday. There will be no make up quizzes or midterm.

**Projects:** The [projects](#) should be done in groups of 2 or 3 students. Once a project has been chosen, the students in the group are required to read, discuss and fill out the corresponding gaps in the paper or section in the book. All papers are written at elementary level. During the last week of the term, students will be required to hand in their project and if time allows it the most exciting ideas of the project will be presented

in class.

**Exam Schedule:**

Midterm : Friday, March 12, S B Union 237

Final Exam: Wednesday, May 19, 8:00-10:30 a.m., S B Union 237

**Students with Disabilities:**

If you have a physical, psychological, medical or learning disability that may impact your course work, please contact Disability Support Services, ECC (Educational Communications Center) Building, room 128, (631) 632-6748. They will determine with you what accommodations are necessary and appropriate. All information and documentation is confidential.

Students requiring emergency evacuation are encouraged to discuss their needs with their professors and Disability Support Services. For procedures and information, go to the following web site

<http://www.ehs.stonybrook.edu/fire/disabilities.asp>

# MAT 351, Spring 2004

## Topics and Assignments

Week	Topics	Assignments
Jan 26 - 30	Examples of Dynamical Systems: 1.1 Preliminaries from Calculus: 1.2	
Feb 2 - 6	Preliminaries from Calculus: 1.2 Elementary Definitions: 1.3	Section 1.2 # 4, 5, 6, 7, 8, 9
Feb 9 - 13	Hyperbolicity: 1.4 An Example: The Quadratic Family: 1.5	Section 1.3 # 6, 7, 9, 10 Section 1.4 # 1a, 1k, 2b, 2e, 6
Feb 16 - 20	An Example: The Quadratic Family: 1.5	Section 1.5: 1, 3, 6, 7, 8
Feb 23 - 27	Symbolic Dynamics: 1.6 Topological Conjugacy: 1.7	Section 1.6: 4, 6 Section 1.7: 1, 2, 3
Mar 1 - 6	Chaos: 1.8	Section 1.8 # 1, 3, 6, 7, 8, 9, 10
Mar 8 - 12	1.8 Chaos <b>Midterm!</b> <a href="#">PostScript</a> , <a href="#">PDF</a> , <a href="#">HTML</a> ,	
Mar 15 - 19	Structural Stability: 1.9	Section 1.9: 1, 2, 3, 5, 6, 12, 17
Mar 22 - 26	Sarkovskii's Theorem: 1.10	You can choose one of the following papers and explain to us in half hour

		what is the paper about. <a href="#">Projects</a> ,
Mar 29 - Apr 2	Sarkovskii's Theorem: 1.10	
Apr 5 - 9	<b>Spring Break</b>	
Apr 12- 16	The Schwarzian Derivative 1.11	Section 1.10 # 2,5 Section 1.11 # 3, 4
Apr 19 - 23	Bifurcation Theory 1.12	Section 1.12 # 1, 6, 7
Apr 26 - 30	Presentation of Projects	
May 3 - 7	Presentation of Projects	
May 19	<b>Final!!</b>	8:00-10:30 a.m. S B Union 237

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