

Stony Brook University
Mathematics Department
Alena Erchenko

Differential Equations: Dynamics and Change
MAT 351, LEC 01
Spring 2020

Updated Syllabus

Course description: A study of the long-term behavior of solutions to ordinary differential equations or of iterated mappings, emphasizing the distinction between stability on the one hand and sensitive dependence and chaotic behavior on the other. The course describes examples of chaotic behavior and of fractal attractors, and develops some mathematical tools for understanding them.

Credits: 3.

Prerequisite: C or higher in the following: MAT 203 or 205 or 307 or AMS 261; MAT 303 or 305 or 308 or AMS 361; MAT 200 or permission of instructor.

Class time and location:

Starting 3/30/2020: Tuesdays and Thursdays 1:00pm- 2:20pm EST live in Zoom (accessed through Blackboard). Moreover, lecture notes and recordings will be available on Blackboard.

Up to 3/13/2020: Tuesdays and Thursdays 1:00pm- 2:20pm in Physics P113.

Instructor: Alena Erchenko.

E-mail: alena.erchenko@stonybrook.edu

Office: Simons Center for Geometry and Physics 508 (not applicable after 3/13/2020)

Website: you.stonybrook.edu/aerchenko

Office hours (in Zoom accessed through Blackboard): Tuesday 4:30pm-5:30pm, Friday 11am-12pm, or by appointment

Math Learning Center hours (via a TBD digital method, see Blackboard): Wednesday 1pm-2pm

Grader: Willie Rush Lim

E-mail: lim.willie@stonybrook.edu

Office: Math Tower S-240A (not applicable after 3/13/2020)

Math Learning Center hours (via a TBD digital method, see Blackboard): Monday 10:30am-11:30am, Thursday 4pm-5pm

Textbook: We will not follow closely a particular book. “A First Course in Dynamics with panorama of recent developments” by Boris Hasselblatt and Anatole Katok is a good reference for most of the topics that we will discuss (and a lot more!).

Other useful references are:

An Introduction to Chaotic Dynamical Systems *by Robert Devaney;*

Chaos: An introduction to dynamical systems *by Alligood, Sauer, and Yorke;*

An Introduction to Dynamical Systems by R. Clark Robinson;
Nonlinear Dynamics and Chaos: With Applications to Physics, Biology, Chemistry, and
Engineering by Steven H. Strogatz.

Attendance: Attendance/live attendance of the digital lectures is strongly encouraged but not required. If you miss a class/live lecture, you are still responsible for the material due, for learning all concepts covered, and turning in assignments given. Class/live lecture participation (answering and asking questions during class/live lecture) is encouraged.

Blackboard: Most of the material for this course will appear on Blackboard. It is important that you have access to and familiarize yourself with this page. In particular, Zoom lectures will be accessed on Blackboard and assignments have to be submitted through Blackboard.

Grading

Homework	30%
Midterm	30%
Final exam	40%

Homework: Homework will be assigned on a weekly basis and collected in the Assignments section of Blackboard (starting 3/30/2020) on Thursdays before 11:59pm EST. Homework will be posted on Blackboard. By the choice of the lecturer, some homework problems will be graded and some not. It is in your best interest to complete all assigned problems since you will not know which problems will be graded in advance. Any homework turned in after the due time will be considered late. No late homework will be accepted. If you cannot submit your homework before the due time, then make sure to inform your instructor, Alena Erchenko, if it was due to a valid reason. One lowest score for homework will be dropped. You may work with other students on the homework, but you must hand in your own write-ups. When you write up your homework, use complete sentences and please try to write legibly.

Examinations: One 1 hour and 20 minute examination was given during the semester. A comprehensive take-home final examination will be given during the final examination period. The final exam will be posted on Blackboard a week prior to the due date and time, which is the same as the due date and time of our officially designated final exam period. You will have to submit your final exam before that time in the Assignment section of Blackboard. On the final exam, you are allowed to consult textbooks, homework, and lecture material. On the final exam, you are expected not to discuss the exam problems with anyone digitally or in-person. You will be required to sign a statement that you have followed these rules. We have the following schedule for the exams:

Exam	Date	Time	Location
Midterm	March 10, 2020 (Tuesday)	1:00 pm – 2:20 pm	Physics P113
Final Exam	Due May 19, 2020 (Tuesday)	Due at 5:00 pm EST	Blackboard

Makeup Examinations: No alternative date will be given for the midterm or the final exam. If a student has a valid documented reason, such as illness, during examination times and informs the instructor, Alena Erchenko, beforehand, then he/she is permitted to schedule a makeup examination with no penalty. A missed examination must be made up within 7 days of the original date. Students must be prepared to verify the reason for requesting the makeup by providing the proper document(s) upon request. Conflicts with other exams, personal business such as travel, employment, weddings, graduations, or attendance at public events such as concerts and sporting events are not valid excuses. Forgetting the date or time of an examination is not a valid excuse either. If a student misses an exam / misses to submit on time, does not have a valid documented excuse, and does not inform the instructor, Alena Erchenko, then he/she gets 0 points for the exam.

Questions, Problems, or Comments: If you have questions or concerns about the course, please consult your instructor, Alena Erchenko.

Student Accessibility Support Center (SASC) statement: If you have a physical, psychological, medical or learning disability that may impact your course work, please contact Student Accessibility Support Center, ECC (Educational Communications Center) Building, Room 128, (631)632-6748. They will determine with you what accommodations, if any, are necessary and appropriate. All information and documentation is confidential. Students who require assistance during emergency evacuation are encouraged to discuss their needs with their professors and Student Accessibility Support Center. For procedures and information go to the following website: <http://www.stonybrook.edu/ehs/fire/disabilities>.

Academic integrity statement: Each student must pursue his or her academic goals honestly and be personally accountable for all submitted work. Representing another person's work as your own is always wrong. Faculty is required to report any suspected instances of academic dishonesty to the Academic Judiciary. Faculty in the Health Sciences Center (School of Health Technology & Management, Nursing, Social Welfare, Dental Medicine) and School of Medicine are required to follow their school-specific procedures. For more comprehensive information on academic integrity, including categories of academic dishonesty please refer to the academic judiciary website at http://www.stonybrook.edu/commcms/academic_integrity/index.html

Critical incident management: Stony Brook University expects students to respect the rights, privileges, and property of other people. Faculty are required to report to the Office of University Community Standards any disruptive behavior that interrupts their ability to teach, compromises the safety of the learning environment, or inhibits students' ability to learn. Faculty in the HSC Schools and the School of Medicine are required to follow their school-specific procedures. Further information about most academic matters can be found in the Undergraduate Bulletin, the Undergraduate Class Schedule, and the Faculty-Employee Handbook.