FORDHAM UNIVERSITY
THE JESUIT UNIVERSITY OF NEW YORK

Mathematical Modelling, Fall 2022

Math 1700-R01

This course introduces students to the study of discrete dynamical systems and shows how mathematical models can be built and used to solve problems in many fields.
3 hours/week, 4 credits.

Meetings

Lectures MTh 4-5:15pm JMH 406

Contact Information

Instructor:	John Adamski, PhD
Email:	adamski@fordham.edu
Website:	https://johnadamski.com/
Office:	JMH 418
Office Phone:	718-817-0427
Office Hours	Tue 11:30am-1:30pm, Thu 1:30-3:30pm

Textbook

We will be using the text *Introduction to Mathematical Modeling Using Discrete Dynamical Systems* by Frederick R. Marotto. The author has generously provided a free PDF for use in this course. It can be found at the link below.

https://johnadamski.com/dynsystextbook.pdf

Additional reading materials will be distributed in class.

Homework

Every 1-2 weeks, homework assignments will be distributed in class and due at the beginning of class one week later, when complete solutions will be distributed. It is important that you keep up with this pace and do not fall behind. Incomplete work will be accepted and partial credit will be given, but late assignmets will not be accepted. Some homework problems will be easy, and some will be challenging. Some homework problems will refer to additional readings (distributed in class). You are expected to solve all of the assigned problems to the best of your ability and show all of your work. Correct answers with no work shown will not receive full credit. You should take time to make your work neat and legible. Keep in mind that someone other than yourself will be reading what you write, so write in a way that others can follow.

Grades

20%	Homework, H	
25%	Exam 1, E_1	M 10/3
25%	Exam 2, E_2	Th 11/3
30%	Final Exam, F	M 12/19

$$\text{Course Grade} = .2H + .25E_1 + .25E_2 + .3F$$

Exams will be taken in-class with paper and pencil/pen, without the assistance of notes or formula sheets. The use of scientific calculators is allowed (but not graphing calculators).

Grades will be posted to Blackboard throughout the semester.

Attendance

I want to help you all succeed in this course. I want you all to help each other succeed in this course. We can't do that if we don't all come to class and participate. So please attend every class. It is both the simplest and most important thing you can do. I will keep attendance records.

Resources

- You can come to my office hours or make an appointment by email to meet with me at another time.
- You can go to the Math Help Room (JMH 410 at Rose Hill; QuinnX at Lincoln Center) whenever it is open. The schedule is posted online. It is free, and you don't need an appointment.
- FCRH and FCLC students may make tutoring appointments through Knack.

Academic Integrity

From the university's website:

> A university, by its nature, strives to foster and recognize originality of thought, which can be recognized only when people produce work that is theirs alone, properly acknowledging information and ideas that are obtained from the work of others. It is therefore important that students must maintain the highest standards with regard to honesty, effort, and performance.
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> As a Jesuit, Catholic university, Fordham is committed to ensuring that all members of the academic community strive not only for excellence in scholarship but also for integrity of character. In the pursuit of knowledge and personal development, it is imperative that students present their own ideas and insights for evaluation, critique, and eventual reformulation. As part of this process, each student must acknowledge the intellectual contributions of others.

By being enrolled at Fordham University, students are bound to comply with the Univeristy Code of Conduct, which includes, but it not limited to the Standards of Academic Integrity. For more information, see Undergraduate Academic Integrity Policy.

Disabilities

Under the Americans with Disabilities Act, all members of the campus community are entitled to equal access to the programs and activities of Fordham University. If you have (or think that you might have) a disability that may impact your participation in the activities, coursework, or assessment of this course, you may be entitled to accommodations through the Office of Disability Services. You can contact them at `disabilityservices@fordham.edu`, 718-817-0655, or by visiting the lower level of O'Hare Hall (Rose Hill campus) or Lowenstein 408 (Lincoln Center campus).

Whether or not you have documentation for accommodations, your success in this class is important to me. If there are aspects of this course that are not accessible to you, please let me know as soon as possible so that we can work together to develop strategies to meet both your needs and the requirements of the course.

Schedule

Class	Date	Topic
1	Th 9/1	Welcome, Ch.1 Introduction to Discrete Dynamical Systems
2	W 9/7	2.1 Some Linear Models
3	Th 9/8	2.2 Linear Equations and their Solutions
4	M 9/12	2.3 Homogeneous Equations and their Applications
5	Th 9/15	2.4 Solutions of Non-Homogenous Equations
6	M 9/19	2.5 Applications of Non-Homogeneous Equations
7	Th 9/22	2.6 Dynamics of Linear Equations
8	M 9/26	2.7 Emperical Models and Linear Regression
9	Th 9/29	Review
10	M 10/3	Exam 1 (Ch. 2)
11	Th 10/6	3.1 Some Non-Linear Models
12	Th 10/13	3.2 Autonomous Equations and their Dynamics
13	M 10/17	3.3 Cobwebbing, Derivatives, and Dynamics
14	Th 10/20	3.4 Some Mathematical Applications
15	M 10/24	3.5 Periodic Points and Cycles
16	Th 10/27	3.6 Parameterized Families
17	M 10/31	Review
18	Th 11/3	Exam 2 (Ch. 3)
19	M 11/7	4.1 Some Linear Systems Models, 4.2 inear Systems and their Dynamics
20	Th 11/10	4.3 Some Vector and Matrix Arithmetic
21	M 11/14	4.4 Stability and Eigenvalues
22	Th 11/17	4.6 Comple Numbers and their Arithmetic
23	M 11/21	4.7 Complex Eigenvalues
24	M 11/28	4.8 Non-Homogeneous Systems
25	Th 12/1	Introduction to Holomorphic Dynamics
26	M 12/5	Introduction to Holomorphic Dynamics
27	Th 12/8	Review
	M 12/19	Final Exam (Ch. 2-4)