

## MATH 473/573: Intermediate Differential Equations

### *Fall 2020 Course Syllabus*

**NJIT Academic Integrity Code:** All Students should be aware that the Department of Mathematical Sciences takes the University Code on Academic Integrity at NJIT very seriously and enforces it strictly. This means that there must not be any forms of plagiarism, i.e., copying of homework, class projects, or lab assignments, or any form of cheating in quizzes and exams. Under the University Code on Academic Integrity, students are obligated to report any such activities to the Instructor.

### COURSE INFORMATION

**Course Description:** Topics in the qualitative behavior of solutions of ordinary differential equations with applications to engineering problems. Includes phase plane analysis, stability, dynamical systems, and chaos.

**Number of Credits:** 3

**Prerequisites:** **MATH 222** with a grade of C or better and **MATH 337** with a grade of C or better.

**Course-Section and Instructors**

Course-Section	Instructor
Math 473-001 (also 573)	Professor R. Goodman

**Office Hours for All Math Instructors:** [Fall 2020 Office Hours and Emails](#)

**Required Textbook:**

<b>Title</b>	<i>Nonlinear Dynamics and Chaos with Applications to Physics, Biology, Chemistry and Engineering</i>
<b>Author</b>	S. Strogatz
<b>Edition</b>	2nd
<b>Publisher</b>	Westview Press
<b>ISBN #</b>	978-0813349107
<b>Recommended Materials</b>	Additional material will be distributed by the instructor on the course canvas page.
<b>Website</b>	<a href="#">Course Canvas Page</a>

**University-wide Withdrawal Date:** The last day to withdraw with a **W** is **Monday, November 9, 2020**. It will be strictly enforced.

### COURSE GOALS

## Course Objective:

- Understand the meaning of terms in simple ODE and iterated map models.
- Use geometric (phase plane) methods to understand the behavior of 2-dimensional ODE systems.
- Draw and understand bifurcations diagrams used to understand how the behavior of systems changes with parameters; classify bifurcations into the main types and understand what dynamics associated with each.
- Perform linear stability analysis of fixed points.
- Simulate ODE and iterated map models on a computer using MATLAB (or other approved language). Plot and interpret the results.
- **Put it all together:** through a combination of theory and computation understand the behavior of ODE and iterated map models and how the behavior changes with parameters.

## POLICIES

**DMS Course Policies:** All DMS students must familiarize themselves with, and adhere to, the **Department of Mathematical Sciences Course Policies**, in addition to official **university-wide policies**. DMS takes these policies very seriously and enforces them strictly.

**Homework and Grading Policy:** Weekly Homework assignments consisting of textbook problems will be posted on Canvas. There will also be a number of video assignments, where students will record themselves explaining the solution to a longer problem and post the answer to a private video-sharing website, [www.flipgrid.com](http://www.flipgrid.com).

**Grading Policy:** The final grade in this course will be determined as follows:

Homework and Class Participation	30%
Unit Exams	15%+15%
Project/ Presentation	20%
Final Exam	20%

Your final letter grade will be based on the following tentative curve.

A	90 - 100	C	70 - 74
B+	85 - 89	D	60 - 69
B	80 - 84	F	0 - 59
C+	75 - 79		

**Attendance Policy:** Attendance at all classes will be recorded and is **mandatory**. Please make sure you read and fully understand the **Math Department's Attendance Policy**. This policy will be strictly enforced.

**Math 573:** If any student enrolls in this class as Math 573, then extra work will be assigned to that student and the grade breakdown will be adjusted accordingly.

**Exams:** There will be two unit exams held during class the semester and one final exam. The unit exams are 60 minutes. They will be held on Canvas using Respondus Monitor and Lockdown Browser. Exams are held on the following days:

Unit 1 Exam	Friday, September 25, 2020
Unit 2 Exam	Friday, November 6, 2020
Final Exam Period	December 15 - 21, 2020

The final exam will test your knowledge of all the course material taught in the entire course. Make sure you read and fully understand the **Math Department's Examination Policy**. This policy will be strictly enforced.

**Makeup Exam Policy:** There will be **NO MAKE-UP QUIZZES OR EXAMS** during the semester. In the event an exam is not taken under rare circumstances where the student has a legitimate reason for missing the exam, the student should contact the Dean of Students office and present written verifiable proof of the reason for missing the exam, e.g., a doctor's note, police report, court notice, etc. clearly stating the date AND time of the mitigating problem. The student must also notify the Math Department Office/Instructor that the exam will be missed.

**Cellular Phones:** All cellular phones and other electronic devices must be switched off during all class times.

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## ADDITIONAL RESOURCES

**Math Tutoring Center:** Located in the Central King Building, Lower Level, Rm. G11 (See: **Fall 2020 Hours**)

**Further Assistance:** For further questions, students should contact their instructor. All instructors have regular office hours during the week. These office hours are listed on the Math Department's webpage for **Instructor Office Hours and Emails**.

All students must familiarize themselves with and adhere to the Department of Mathematical Sciences Course Policies, in addition to official university-wide policies. The Department of Mathematical Sciences takes these policies very seriously and enforces them strictly.

**Accommodation of Disabilities:** Disability Support Services (DSS) offers long term and temporary accommodations for undergraduate, graduate and visiting students at NJIT.

If you are in need of accommodations due to a disability please contact Chantonette Lyles, Associate Director of Disability Support Services at **973-596-5417** or via email at **lyles@njit.edu**. The office is located in Kupfrian Hall, Room 201. A Letter of Accommodation Eligibility from the Disability Support Services office authorizing your accommodations will be required.

For further information regarding self identification, the submission of medical documentation and additional support services provided please visit the Disability Support Services (DSS) website at:

- <https://www.njit.edu/studentsuccess/accessibility/>

**Important Dates** (See: **Fall 2020 Academic Calendar, Registrar**)

Date	Day	Event
September 1, 2020	T	First Day of Classes
September 5, 2020	S	Saturday Classes Begin
September 7, 2020	M	Labor Day
September 8, 2020	T	Monday Classes Meet
September 8, 2020	T	Last Day to Add/Drop Classes
November 9, 2020	M	Last Day to Withdraw
November 25, 2020	W	Friday Classess Meet
November 26-29, 2020	R - Su	Thanksgiving Recess - University Closed
Decemeber 10, 2020	R	Last Day of Classes
December 11 & 14, 2020	F & M	Reading Days
December 15 - 21, 2020	F - R	Final Exam Period

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## Course Outline\*

\*Rough Course Outline. Please see [Canvas](#) for details.

Unit	Dates	Chapters	Test Date
1: One-dimensional flows	9/1-9/18	1-4	September 25
2: Two-dimensional flows	9/22-11/3	5-8	November 6
3: Chaos	11/10-12/8	9-12	Final Exam Week

*Updated by Professor R. Goodman - 8/26/2020  
Department of Mathematical Sciences Course Syllabus, Fall 2020*

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