MATH 613: Advanced Applied Mathematics I: Modeling
Fall 2022 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.

Please note that it is my professional obligation and responsibility to report any academic misconduct to the Dean of Students Office. Any student found in violation of the code by cheating, plagiarizing or using any online software inappropriately will result in disciplinary action. This may include a failing grade of F, and/or suspension or dismissal from the university. If you have any questions about the code of Academic Integrity, please contact the Dean of Students Office at dos@njit.edu.

COURSE INFORMATION

Course Description: Concepts and strategies of mathematical modeling are developed by investigation of case studies in a selection of areas. Consistency of a model, nondimensionalization and scaling, regular and singular effects are discussed. Possible topics include continuum mechanics (heat and mass transfer, fluid dynamics, elasticity), waves, kinetics, population dynamics, traffic flow, and the Sommerfeld problem.

Number of Credits: 3

Prerequisites: MATH 331 and MATH 337, or departmental approval.

Course-Section and Instructors:

Course-Section	Instructor
Math 613-001	Professor M. Siegel

Office Hours for All Math Instructors: Fall 2022 Office Hours and Emails

Required Textbook:

Title	*Introduction to the Foundations of Applied Mathematics*
Author	Mark Holmes
Edition	2nd
Publisher	Springer

ISBN #	9783030242602 9783030242619

University-wide Withdrawal Date: The last day to withdraw with a **M** is **Monday, November 14, 2022**. It will be strictly enforced.

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.

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

Assignments	30%
Midterm Exam	30%
Final Exam	40%

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

A	84 - 100	C+	60 - 69
B+	77 - 83	D	50 - 59
B	70 - 76	F	0 - 49

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.

Homework: Homework is assigned each week, and is expected to be handed in on time. Late submissions will be penalized.

Exams: There will be one midterm exam held in class during the semester and one comprehensive final exam. Exams are held on the following days:

Midterm Exam	October 27, 2022
Final Exam Period	December 16 – 22, 2022

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: To properly report your absence from a midterm or final exam, please review and follow the required steps under the DMS Examination Policy found here:

http://math.njit.edu/students/policies_exam.php

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

ADDITIONAL RESOURCES

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.

Accommodation of Disabilities: The Office of Accessibility Resources and Services (OARS) 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 Scott Janz, Associate Director of Disability Support Services at 973-596-5417 or via email at scott.p.janz@njit.edu. The office is located in Kupfrian Hall, Room 201. A Letter of Accommodation Eligibility from the Office of Accessibility Resources and 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 Office of Accessibility Resources and Services (OARS) website.

Important Dates (See: Fall 2022 Academic Calendar, Registrar)

Date	Day	Event
September 5, 2022	Monday	Labor Day
September 6, 2022	Tuesday	First Day of Classes
September 12, 2022	Monday	Last Day to Add/Drop Classes
November 14, 2022	Monday	Last Day to Withdraw
November 22, 2022	Tuesday	Thursday Classes Meet
November 23, 2022	Wednesday	Friday Classes Meet
November 24 to November 25, 2022	Thursday and Friday	Thanksgiving Recess - Closed
November 26, 2022	Saturday	Saturday Classes Meet
December 14, 2022	Wednesday	Last Day of Classes
December 15, 2022	Thursday	Reading Day
December 16 to December 22, 2022	Friday to Thursday	Final Exam Period

Course Outline

Week	Topic
1	Introduction and non-dimensionalization
2	Non-dimensionalization, Perturbation Expansions

3	Perturbation Expansions
4	Kinetics
5	Kinetics, Disease Modeling
6	Diffusion
7	Random Walks, Brownian Motion
8	Langevin equation, Midterm
9	Waves
10	Traffic flow, Shocks
11	Continuum Mechanics
12	Fluid Dynamics
13	Fluid Dynamics
14	Special Topics
15	Review
Final Exam Period	December 16 – 22, 2022