Fall 2019

# MATH 450-H01: Methods of Applied Mathematics I

S. Afkhami

NJIT New Jersey's Science & Technology University

THE COLLEGE OF SCIENCE AND LIBERAL ARTS

THE DEPARTMENT OF MATHEMATICAL SCIENCES

# MATH 450H: Methods of Applied Mathematics I (Capstone I)
## *Fall 2019 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**: Combines mathematical modeling with physical and computational experiments conducted in the Undergraduate Mathematics Computing Laboratory. Effective From: Spring 2009.

**Number of Credits**: 3

**Prerequisites**: Math 331 with a grade of C or better, Math 337 with a grade of C or better, and Math 340 with a grade of C or better.

**Course-Section and Instructors**

| Course-Section | Instructor |
|---|---|
| Math 450-H01 | Professor S. Afkhami |

**Office Hours for All Math Instructors**: Fall 2019 Office Hours and Emails

**Course Materials**:

| | |
|---|---|
| **Title** | *Mathematical Models in the Applied Sciences* |
| **Author** | A. C. Fowler |
| **ISBN** | 9780521467032 |

- C. C. Lin and Lee A. Segel: Mathematics Applied to Deterministic Problems in the Natural Sciences; ISBN: 978-0-89871-229-2
- Segel and G. H. Handelman, Mathematics Applied to Continuum Mechanics, ISBN-13: 978-0-89871-620-7

**University-wide Withdrawal Date**: The last day to withdraw with a **W** is **Monday, November 12, 2019**. 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:

| | |
|---|---|
| **Homework** | 50% |
| **Midterm Exam (Nov. 4)** | 20% |
| **Final Exam** | 30% |

**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.

**Makeup Exam Policy**: To properly report their absence during a midterm or final exam, please review 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

**Math Tutoring Center**: Located in the Central King Building, Lower Level, Rm. G11 (See: Fall 2019 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 Fenster Hall Room 260. 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 2019 Academic Calendar, Registrar)

| Date | Day | Event |
|---|---|---|
| September 4, 2019 | T | First Day of Classes |
| September 10, 2019 | M | Last Day to Add/Drop Classes |
| November 12, 2019 | M | Last Day to Withdraw |
| November 20, 2019 | T | Thursday Classes Meet |
| November 21, 2019 | W | Friday Classes Meet |
| November 22 - 25, 2019 | R - Su | Thanksgiving Recess |
| December 12, 2019 | W | Last Day of Classes |
| December 13 & 14, 2019 | R & F | Reading Days |
| December 15 - 21, 2019 | Sa - F | Final Exam Period |

# Course Outline

| Introduction |
| --- |
| Introduction to Mathematical Modeling |
| Nondimensionalization |
| Asymptotics and Perturbation Methods |
| Introduction to Continuum Mechanics |
| Heat Transfer |
| Viscous Flow |
| Solid Mechanics and Elasticity Theory |
| Visco-Elasticity |
| Two-Phase Flow |
| Examples of Stability Analysis in Fluid Flows |
| Introduction to Numerical Methods |
| Numerical Methods for PDE's |
| Numerical Methods for PDE's with Moving Boundaries: Interface Problems |

*Updated by Professor S. Afkhami - 9/4/2019*
*Department of Mathematical Sciences Course Syllabus, Fall 2019*