# MATH 611: Numerical Methods for Computation
## *Fall 2018 Graduate 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:** This course provides a practical introduction to numerical methods. Numerical solution of linear systems. Interpolation and quadrature. Interative solution of nonlinear systems. Computation of eigenvalues and eigenvectors. Numerical solution of initial and boundary value problems for ODE's. Introduction to numerical solution of PDE's. Applicatons drawn from science, engineering, and finance.

**Number of Credits**: 3

**Prerequisites**: Calculus I, II, III; Differential Equations and Linear Algebra.

**Course-Section and Instructors**

| Course-Section | Instructor |
|---|---|
| Math 611-101 | Professor M. Siegel |

**Office Hours for All Math Instructors**: Fall 2018 Office Hours and Emails

**Required Textbooks:**

| Title | *Numerical Analysis* |
|---|---|
| Author | Faires and Burden |
| Edition | 4th or 10th |
| Publisher | Cengage |
| ISBN # | 978-0495114765 or 978-1305253667 |

ExtraInfo

**University-wide Withdrawal Date:**The last day to withdraw with a **W** is **Monday, November 12, 2018**. It will be strictly enforced.

## COURSE GOALS

**Learning Outcomes**

- Analyze errors arising in numerical computation of solutions to mathematical and applied problems
- Apply numerical techniques to find solutions of nonlinear equations, linear systems of equations and differential equations.
- Apply numerical techniques for interpolation, differentiation and quadrature problems.
- Communicate advantages and disadvantages of various numerical techniques and select appropriate numerical methods for specific problems.

## 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 | 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.

**Homework Policy**: Homework assignments will require use of MATLAB software.

**Exams**: There will be one midterm exam held in class during the semester and one comprehensive final exam. The final exam will be held during the following week:

| Midterm Exam | Lecture 8 |
|---|---|
| Final Exam Week | December 15 - 21, 2018 |

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

**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.  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:

- http://www5.njit.edu/studentsuccess/disability-support-services/

**Important Dates** (See: Fall 2018 Academic Calendar, Registrar)

| Date | Day | Event |
|---|---|---|
| September 4, 2018 | T | First Day of Classes |
| September 10, 2018 | M | Last Day to Add/Drop Classes |
| November 12, 2018 | M | Last Day to Withdraw |
| November 20, 2018 | T | Thursday Classes Meet |
| November 21, 2018 | W | Friday Classes Meet |
| November 22 - 25, 2018 | R - Su | Thanksgiving Recess |
| December 12, 2018 | W | Last Day of Classes |
| December 13 & 14, 2018 | R & F | Reading Days |
| December 15 - 21, 2018 | Sa - F | Final Exam Period |

# Course Outline

| Lecture | Section | Topic | Assignment |
|---|---|---|---|
| 1 | Chapters 0 and 1 | Calculus Review, Foundations of Numerical Analysis and Introduction to Rootfinding | See Course Website |
| 2 | Chapter 2 | Rootfinding for nonlinear equations | See Course Website |
| 3 | Chapter 2 and 10 | Rootfinding for nonlinear equations | See Course Website |
| 4 | Chapter 6 | Linear systems of equations | See Course Website |
| 5 | Chapters 6 and 7 | Linear systems of equations Eigenvalues and eigenvectors | See Course Website |
| 6 | Chapter 3 | Interpolation | See Course Website |
| 7 | Chapter 8 | Least Squares | See Course Website |
| 8 | | **MIDTERM EXAM** | |
| 9 | Chapter 4 | Differentiation and Integration | See Course Website |
| 10 | Chapter 4 | Differentiation and Integration | See Course Website |
| 11 | Chapter 5 | Ordinary Differential Equations – Initial Value Problems | See Course Website |
| 12 | Chapter 5 | Ordinary Differential Equations – Initial Value Problems | See Course Website |
| 13 | Chapter 11 | Ordinary Differential Equations – Initial Value Problems and Boundary Value Problems | See Course Website |
| 14 | | Miscellaneous TOpics | See Course Website |