

THE DEPARTMENT OF MATHEMATICAL SCIENCES

## MATH 111: Calculus I

### *Fall 2023 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 include limits, differentiation, applications of differentiation, and integration

**Number of Credits:** 4

**Prerequisites:** MATH 110 or placement by performance on standardized entrance examinations.

**Course-Section and Instructors:**

| Course-Section | Instructor              |
|----------------|-------------------------|
| Math 111-001   | Professor S. Erfani     |
| Math 111-003   | Professor S. Erfani     |
| Math 111-005   | Professor T. Takahashi  |
| Math 111-007   | Professor T. Takahashi  |
| Math 111-009   | Professor N. Mitrov     |
| Math 111-011   | Professor J. Davis      |
| Math 111-013   | Professor T. Sherman    |
| Math 111-015   | Professor T. Sherman    |
| Math 111-017   | Professor D. Abadi      |
| Math 111-019   | Professor D. Abadi      |
| Math 111-021   | Professor A. Flax       |
| Math 111-023   | Professor J. Ratnaswamy |
| Math 111-025   | Professor R. Bouayad    |
| Math 111-027   | Professor R. Bouayad    |

|              |                        |
|--------------|------------------------|
| Math 111-029 | Professor N. Massoud   |
| Math 111-031 | Professor J. Davis     |
| Math 111-033 | Professor N. Tsipenyuk |
| Math 111-035 | Professor N. Tsipenyuk |
| Math 111-037 | Professor A. Flax      |
| Math 111-039 | Professor A. Flax      |
| Math 111-041 | Professor S. Alptekin  |
| Math 111-043 | Professor A. Elassa    |
| Math 111-101 | Professor G. Behkit    |

Office Hours for All Math Instructors: **Fall 2023 Office Hours and Emails**

Required Textbook:

|           |  |
|-----------|--|
| Title     | <i>Thomas' Calculus: Early Transcendentals</i> |
| Author    | Hass, Heil, and Weir                           |
| Edition   | 15th   |
| Publisher | Pearson  |
| ISBN #    | 9780137559893<br>9780137560042                 |

University-wide Withdrawal Date: The last day to withdraw with a W is **Monday, November 13, 2023**. It will be strictly enforced.

## STUDENT RESPONSIBILITIES

- Read and understand the syllabus.
- Adhere to all policies and procedures
- Report conflicts and/or special circumstances in a timely manner
- Report any instances of violations of Academic Integrity to your Instructor
- Communicate directly with your Instructor on ALL course-related matters, including material, procedures, policies and exams. **NOTE: Do not attempt to contact other instructors or the course Coordinator - you will not get a response. All course information will be communicated to you directly by your instructor.**
- Effectively manage time and devote sufficient time to succeeding in this course
- Keep track of your grades
- Make use of all resources available to help you learn
- Be respectful of peers and your instructor

- Accept responsibility for your grades - requests for extra credit opportunities will be denied

## COURSE GOALS

### Course Objectives

- Students should (a) learn about limits and their central role in calculus, (b) learn about derivatives and their relationship to instantaneous rates of change, (c) understand many practical applications of derivatives, (d) gain experience in the use of approximation in studying mathematical and scientific problems, (e) learn about integrals: their origin in the area problem and their relationship to derivatives.
- Students should gain an appreciation for the importance of calculus in scientific, engineering, computer, and other applications.
- Students should gain experience in the use of technology to facilitate visualization and problem solving.

### Course Outcomes

- Students have improved logical thinking and problem-solving skills.
- Students have a greater understanding of the importance of calculus in science and technology.
- Students are prepared for further study in mathematics as well as science, engineering, computing, and other areas.

**Course Assessment:** The assessment of objectives is achieved through homeworks, quizzes, and common examinations with common grading.

## 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:

|                      |     |
|----------------------|-----|
| Quizzes and Homework | 17% |
| Common Midterm 1     | 17% |
| Common Midterm 2     | 17% |
| Common Midterm 3     | 17% |
| Final Exam           | 32% |

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

|    |          |   |         |
|----|----------|---|---------|
| A  | 88 - 100 | C | 66 - 71 |
| B+ | 83 - 87  | D | 60 - 65 |
| B  | 77 - 82  | F | 0 - 59  |
| C+ | 72 - 76  |   |         |

THE FINAL GRADE DISTRIBUTION WILL BE DETERMINED BY COURSE INSTRUCTORS IN A MEETING TO BE

## HELD AFTER THE FINAL EXAM.

**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. Each class is a learning experience that cannot be replicated through simply "getting the notes."

**Homework:** Homework is a requirement for this class. Online homework will be completed with MyMathLab, which comes with a new copy of the textbook. Access to it can also be purchased directly from the website.

**Quizzes:** Quizzes will be given approximately once a week throughout the semester. They will be based on the lecture, homework and the in-class discussions.

**Exams:** There will be three common midterm exams held during the semester and one comprehensive common final exam. Common Midterm Exams will be held on the following days:

|                         |                                 |
|-------------------------|---------------------------------|
| Common Midterm Exam I   | September 27, 2023              |
| Common Midterm Exam II  | October 25, 2023                |
| Common Midterm Exam III | November 29, 2023               |
| Final Exam              | December 17 - December 23, 2023 |

The time of the midterm exams is **4:15pm - 5:40 PM** for daytime students and **6:00 - 7:25 PM** for evening students. 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](http://math.njit.edu/students/policies_exam.php)

**Mandatory Tutoring Policy:** Based upon academic performance indicating a significant gap in understanding of the course material, students may receive a notice of being assigned to mandatory tutoring to assist in filling the gap. A student will have 2 points deducted from the course average for each instance in which the required tutoring is not completed by the stated deadline.

**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 2023 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**.

**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 need an accommodation due to a disability, please contact the Office of Accessibility Resources and Services at [oars@njit.edu](mailto:oars@njit.edu), or visit Kupfrian Hall 201 to discuss your specific needs. A Letter of Accommodation Eligibility from the office authorizing student accommodations is 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 at:

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

**Important Dates** (See: [Fall 2023 Academic Calendar](#), Registrar)

| Date                             | Day                   | Event                        |
|----------------------------------|-----------------------|------------------------------|
| September 4, 2023                | Monday                | Labor Day                    |
| September 5, 2023                | Tuesday               | First Day of Classes         |
| September 11, 2023               | Monday                | Last Day to Add/Drop Classes |
| November 13, 2023                | Monday                | Last Day to Withdraw         |
| November 21, 2023                | Tuesday               | Thursday Classes Meet        |
| November 22, 2023                | Wednesday             | Friday Classes Meet          |
| November 23 to November 26, 2023 | Thursday and Saturday | Thanksgiving Recess - Closed |
| December 13, 2023                | Wednesday             | Last Day of Classes          |
| December 14, 2023                | Thursday              | Reading Day 1                |
| December 15, 2023                | Friday                | Reading Day 2                |
| December 17 to December 23, 2023 | Sunday to Saturday    | Final Exam Period            |

## Course Outline

| Lecture | Sections | Topic                                      | Assignment in MyMathLab                                |
|---------|----------|--|--|
| 1       | 2.1      | Rates of Change and tangents to Curves     | 1,5,9,13,25  |
| 2       | 2.2      | Limit of a Function and Limit Laws         | 1,2,13,19,22,25,31,33,35,41,47,49, 53,57,63,79,81      |
| 3       | 2.4      | One Sided Limits                           | 3,5,9,13,15,17,27,29,31,37,41                          |
| 4       | 2.5      | Continuity                                 | 3,5,7,15,17,21,25,27,29                                |
| 5       | 2.5/2.6  | Continue Continuity; start Infinite limits | Section 2.5: 35,37,39,45,47,49,53,59,65                |
| 6       | 2.6      | Limits Involving Infinity; Asymptotes      | 7,9,11,23,25,27,31,33,43,45,49,53,63, 67,89,91,105,107 |
| 7       | 3.1      | Tangents and Derivatives at a Point        | 11,13,15,17,21,35                                      |

|    |           |   |  |
|----|-----------|---|--|
| 8  | 3.2       | The Derivative as a Function  | 1,3,5,13,26,33,39,41   |
| 9  | 3.3       | Differentiation Rules   | 5,7,19,25,31,39,41,43,45                                     |
| 10 |           | REVIEW FOR EXAM 1   |  |
| 11 | 3.3       | Differentiation Rules   | 47,53,55,57,59,62,63,74                                      |
| 12 | 3.4       | Derivatives as a Rate of Change   | 1,5,7,10,13,17,21,23,29                                      |
| 13 | 3.5       | Derivatives of Trig Functions   | 2,12,15,16,19,26,29,33,35,55                                 |
| 14 | 3.6       | The Chain Rule  | 5,17,23,25,29,33,35,39,43,47,49,51,61,63,65,67               |
| 15 | 3.6/3.7   | Continue Chain Rule; start Implicit Differentiation                                 | Section 3.6: 71,77,81,83,85,89,97,101                        |
| 16 | 3.7/3.8   | Continue Implicit Differentiation; start Derivatives of Inverses and Logs           | Section 3.7: 1,7,11,15,16,17,19,23,33,39,41                  |
| 17 | 3.8       | Derivatives of Inverse and Log Functions  | 7,9,17,25,28,33,35,39,43,47,61,65,67,69,73,87,93,99          |
| 18 | 3.9       | Inverse Trig Functions  | 5,11,21,23,31,33,34,37,41                                    |
| 19 | 3.10      | Related Rates   | 7,11,15,17,21,23,25  |
| 20 | 3.10/3.11 | Continue Related Rates; Start Linearization   | Section 3.10: 27,31,33,37,40,41                              |
| 21 | 3.11/4.1  | Continue Linearization and Differentials; start Extreme Values                      | Section 3.11: 5,11,13,19,31,35,41,51,53,59                   |
| 22 |           | REVIEW FOR EXAM 2   |  |
| 23 | 4.1       | Extreme Values of Functions   | 7,25,29,33,35,41,47,49,50,51,70                              |
| 24 | 4.2       | The Mean Value Theorem  | 3,4,5,6,11,13,16,21  |
| 25 | 4.2/4.3   | Continue Mean Value Theorem; Start Monotone Functions and the First Derivative Test | Section 4.2: 31,35,37,41,45,47,49,51,56                      |
| 26 | 4.3/4.4   | Continue the First Derivative Test; start Concavity and Curve Sketching             | Section 4.3: 11,13,21,29,37,41,43,51,63,77,79                |
| 27 | 4.4       | Concavity and Curve Sketching   | 7,13,19,23,37,43,46,51,55,59,61,113,123                      |
| 28 | 4.5       | Indeterminate Forms & L'Hopitals Rule   | 7,9,11,15,21,23,25,31,35,39,43,46,48,51                      |
| 29 | 4.5/4.6   | Finish L'Hopitals; Start Applied Optimization                                       | Section 4.5: 53,57,59,60,65,67,69,73,81                      |
| 30 | 4.6       | Applied Optimization  | 4,7,9,11,12,14,23,31,46,47,59,64                             |
| 31 | 4.7       | Newton's Method   | 1,2,5,23   |
| 32 | 4.8       | Antiderivatives   | 5,11,19,35,37,39,41,45,47,54,59,61,69,97,101,104,107,113,127 |
| 33 | 5.1       | Area and Estimating with  | 1,5,8,9,11   |

|    |         |   |   |
|----|---------|---|---|
|    |         | Finite Sums   |   |
| 34 | 5.2     | Sigma Notation and Limits of Finite Sums  | 7,9,17,25,29,37,42,43,47                                  |
| 35 | 5.3     | Definite Integral   | 1,9,13,21,22,33,42,45                                     |
| 36 |         | REVIEW FOR EXAM 3   |   |
| 37 | 5.3/5.4 | Continue Definite Integrals; start Fundamental Theorem of Calculus                              | Section 5.3: 57,59,61,71,79,88                            |
| 38 | 5.4     | Fundamental Theorem of Calculus   | 7,9,13,15,21,23,27,30,41,47,53,55,57,60,61,63,77,79       |
| 39 | 5.5     | Indefinite Integrals and Substitution Method  | 11,15,18,20,21,23,25,26,27,29,33                          |
| 40 | 5.5/5.6 | Finish Indefinite Integrals and Substitution Method; start Substitution and Area Between Curves | Section 5.5: 37,43,47,53,55,59,63,65,79                   |
| 41 | 5.6     | Substitution and Area Between Curves  | 3,12,17,19,27,29,33,39,53,66,71,77,83,87,93,97,99,102,119 |
| 42 |         | Review for Final  |   |
|    |         | FINAL EXAM  |   |

*Updated by Professor J. Bechtold - 8/28/2023  
Department of Mathematical Sciences Course Syllabus, Fall 2023*