

MATH 111: Calculus I

Winter 2022-2023 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, continuity, differentiation, optimization, approximation, and integration. Applications are drawn from engineering, physics, biology, economics, and design. Effective From: Fall 2014.

Number of Credits: 4

Prerequisites: Students **MUST** have passed the same course at NJIT with a grade of “D” or better and are repeating the course to improve their grade.

Course-Section and Instructors:

| Course-Section | Instructor |
|----------------|-----------------------|
| Math 111-W01 | Professor S. Alptekin |

Days, Times, and Locations:

| Days | Times | Locations |
|---------------|------------------|-----------|
| M, T, W, R, F | 9:00AM - 11:45PM | CKB 320 |
| M, T, W, R, F | 12:45PM - 3:15PM | CKB 320 |

Required Textbook:

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

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|--------|--------------------------------|
| ISBN # | 9780137559893 9780137560042 |
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University-wide Withdrawal Date: The last day to withdraw with a **W** is **Wednesday, January 4, 2023**. It will be strictly enforced.

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:

| | |
|----------------------|-----|
| Homework and Quizzes | 30% |
| Midterm Exam | 35% |
| Final Exam | 35% |

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 | | |

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: MyMathLab homework will be assigned through Canvas and is due daily.

Quiz Policy: Short quizzes based on homework and lecture will be given daily.

Exams: There will be one midterm exam held during the semester and a cumulative final exam. Exams will be held on the following days:

| | |
|--------------|------------------|
| Midterm Exam | January 3, 2023 |
| Final Exam | January 13, 2023 |

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.

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**.

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.

Important Dates (See: **Winter 2022-2023 Academic Calendar, Registrar**)

| Date | Day | Event |
|-------------|-----------|---|
| December 26 | Monday | Winter Session Classes Begin |
| December 27 | Tuesday | Last Day to Add/Drop Classes |
| January 1 | Sunday | New Years Day - No Classes |
| January 4 | Wednesday | Last Day to Withdraw |
| January 13 | Friday | Last Day of Winter Session/Final Exams |
| January 14 | Saturday | Inclement Weather Make-Up Day, if necessary |

Course Outline

| Day | Date | Section | Topics |
|-----|-------|---------|--|
| 1 | 12/26 | 2.1 | <i>Rates of Change and Tangents to Curves</i> |
| | | 2.2 | <i>Limit of a Function</i> |
| | | 2.4 | <i>One-Sided Limits</i> |
| 2 | 12/27 | 2.5 | <i>Continuity</i> |
| | | 2.6 | <i>Limits Involving Infinity; Asymptotes of Graphs</i> |
| 3 | 12/28 | 3.1 | <i>Tangents and the Derivative at a Point</i> |
| | | 3.2 | <i>The Derivative as a Function</i> |
| | | 3.3 | <i>Differentiation Rules</i> |
| | | 3.4 | <i>The Derivative as a Rate of Change</i> |
| 4 | 12/29 | 3.5 | <i>Derivatives of Trigonometric Functions</i> |
| | | 3.6 | <i>The Chain Rule</i> |
| 5 | 12/30 | 3.7 | <i>Implicit Differentiation</i> |
| | | 3.8 | <i>Derivatives of Inverse Functions and Logarithms</i> |
| | | 3.9 | <i>Inverse Trigonometric Functions</i> |
| 6 | 1/2 | 3.10 | <i>Related Rates</i> |
| | | 3.11 | <i>Linearization and Differentials</i> |
| 7 | 1/3 | | EXAM |
| 8 | 1/4 | 4.1 | <i>Extreme Values of Functions</i> |
| | | 4.2 | <i>The Mean Value Theorem</i> |
| | | 4.3 | <i>Monotone Functions and the 1st Derivative Test</i> |
| 9 | 1/5 | 4.4 | <i>Concavity and Curve Sketching</i> |
| 10 | 1/6 | 4.5 | <i>Indeterminate Forms and L'Hopital's Rule</i> |
| 11 | 1/9 | 4.6 | <i>Applied Optimization</i> |
| | | 4.7 | <i>Newton's Method</i> |
| | | 4.8 | <i>Antiderivatives</i> |
| 12 | 1/10 | 5.1 | <i>Area and Estimating with Finite Sums</i> |
| | | 5.2 | <i>Sigma Notation and Limits of Finite Sums</i> |
| | | 5.3 | <i>The Definite Integral</i> |

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|----|------|-----|---|
| 13 | 1/11 | 5.4 | <i>The Fundamental Theorem of Calculus</i> |
| | | 5.5 | <i>Indefinite Integrals and the Substitution Method</i> |
| 14 | 1/12 | 5.6 | <i>Substitution and Area Between Curves</i> |
| 15 | 1/13 | | FINAL EXAM |

Updated by Professor S. Alptekin - 12/12/2022
Department of Mathematical Sciences Course Syllabus, Winter 2022-23