

## MATH 112 : Calculus

### *Spring 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.

**DMS Online Exam Policy Spring 2022:** In the event it is determined that DMS will conduct Common Exams online during Spring 2022, those exams will be administered in Canvas with proctoring using both Respondus LockDown Browser+Monitor on a computer (PC or Mac only; iPad and Chromebooks are not currently supported) and Webex on a phone or secondary device.

Please be sure you read and fully understand our **DMS Online Exam Policy**.

### **COURSE INFORMATION**

**Course Description:** Topics include integration, applications of integration, series, exponential and logarithmic functions, transcendental functions, polar coordinates, and conic sections.

**Number of Credits:** 4

**Prerequisites:** **MATH 111** with a grade of C or better or **MATH 132** with a grade of C or better.

**Course-Section and Instructors:**

| Course-Section | Instructor                  |
|----------------|-----------------------------|
| Math 112-002   | Professor R. Reyes Carranza |
| Math 112-004   | Professor J.H. Ro           |
| Math 112-006   | Professor I. Peltekov       |
| Math 112-008   | Professor E. Gulistan       |
| Math 112-010   | Professor S. Alptekin       |
| Math 112-012   | Professor S. Alptekin       |
| Math 112-014   | Professor D. Schmidt        |
| Math 112-016   | Professor D. Schmidt        |
| Math 112-018   | Professor D. Guerra         |

|              |                         |
|--------------|-------------------------|
| Math 112-020 | Professor D. Guerra     |
| Math 112-022 | Professor J. Davis      |
| Math 112-024 | Professor J. Davis      |
| Math 112-026 | Professor J.H. Ro       |
| Math 112-028 | Professor J. Porus      |
| Math 112-030 | Professor J. Zaleski    |
| Math 112-032 | Professor J. Zaleski    |
| Math 112-034 | Professor R. Dandan     |
| Math 112-102 | Professor H. Behzadpour |

Office Hours for All Math Instructors: [Spring 2022 Office Hours and Emails](#)

Required Textbook:

|           |   |
|-----------|---|
| Title     | <i>Thomas' Calculus: Early Transcendentals</i>  |
| Author    | Hass, Heil, and Weir  |
| Edition   | 14th  |
| Publisher | Pearson   |
| ISBN #    | 978-0134768496 (bound)<br>9780134768762 (looseleaf)<br>978-0134764528 (MyMathLab with E-Text) |

University-wide Withdrawal Date: The last day to withdraw with a W is **Monday, April 4, 2022**. 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) develop greater depth of understanding of integration and its importance in scientific and engineering applications, (b) learn about series, including their convergence properties and their use in representing functions, (c) gain experience in the use of approximation in studying mathematical and scientific problems and the importance of mathematically understanding and evaluating the accuracy of approximations, (d) learn new ways of mathematically representing curves and how to use calculus in these settings, and (e) learn alternative coordinate systems which are natural for many problems and learn how calculus can be applied in these systems.
- 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:

|                   |                      |
|-------------------|----------------------|
| Midterm Exam 1    | February 9, 2022     |
| Midterm Exam 2    | March 9, 2022        |
| Midterm Exam 3    | April 20, 2022       |
| Final Exam Period | May 6 - May 12, 2022 |

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: **Spring 2022 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 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](mailto: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 at:

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

**Important Dates** (See: [Spring 2022 Academic Calendar](#), Registrar)

| Date                 | Day                    | Event                        |
|----------------------|------------------------|------------------------------|
| January 18, 2022     | Tuesday                | First Day of Classes         |
| January 22, 2022     | Saturday               | Saturday Classes Begin       |
| January 24, 2022     | Monday                 | Last Day to Add/Drop Classes |
| March 14, 2022       | Monday                 | Spring Recess Begins         |
| March 19, 2022       | Saturday               | Spring Recess Ends           |
| April 4, 2022        | Monday                 | Last Day to Withdraw         |
| April 15, 2022       | Friday                 | Good Friday - No Classes     |
| April 17, 2022       | Sunday                 | Easter Sunday - No Classes   |
| May 3, 2022          | Tuesday                | Friday Classes Meet          |
| May 3, 2022          | Tuesday                | Last Day of Classes          |
| May 4 - May 5, 2022  | Wednesday and Thursday | Reading Days                 |
| May 6 - May 12, 2022 | Friday to Thursday     | Final Exam Period            |

## Course Outline

| Lecture | Sections | Topic                            | Assignment in MyMathLab    |
|---------|----------|----------------------------------|----------------------------|
| 1       | 6.1      | Volumes Using Cross Sections     | 1,5,9,17,19,23,30,33,37    |
| 2       | 6.1      | Volumes Using Cross Sections     | 41,45,47,49,51,53,55,59    |
| 3       | 6.2      | Volumes Using Cylindrical Shells | 3,5,9,11,17,19,21,25,29,33 |
| 4       | 6.3      | Arc Length                       | 1,2,3,4,5,7,15,27          |
| 5       | 6.4      | Areas of Surfaces of Revolution  | 9,13,15,17,19,21,24        |

|   |            |   |   |
|---|------------|---|---|
| 6                                       | 6.5        | Work  | 1,5,7,8,9,11,15,17,19,20                                    |
| 7                                       | 7.3        | Hyperbolic Functions  | 2,7,9,15,17,21,23,43,45,47,49,53,55,<br>57,81               |
| 8                                       | 8.1/8.2    | Using Basic Integration Formulas; start<br>Integration by Parts     | Section 8.1: 3,5,9,10,13,15,27,33,36,38                     |
| 9                                       | 8.2/8.3    | Finish Integration by Parts; start<br>Trigonometric Integrals       | Section 8.2: 3,5,11,13,23,27,29,33,35,<br>37,39,45,47,59    |
| 10                                      |            | <b>REVIEW FOR EXAM #1</b>   |   |
| 11                                      | 8.3/8.4    | Finish Trigonometric Integrals; start<br>Trigonometric Substitution | Section 8.3: 7,9,11,17,19,21,27,31,35,<br>37,38,39,45,65,71 |
| 12                                      | 8.4        | Trigonometric Substitution  | 1,5,7,11,17,19,23,29,35,37,39,41,43,57                      |
| 13                                      | 8.5        | Integration of Rational Functions by Partial<br>Fractions           | 3,7,9,13,14,16,17,19  |
| 14                                      | 8.5        | Integration of Rational Functions by Partial<br>Fractions           | 23,25,27,29,33,35,39,41,45,71                               |
| 15                                      | 8.7        | Numerical Integration   | 3,7,13,17,21,28   |
| 16                                      | 8.8        | Improper Integrals  | 1,4,6,7,9,11,13,17,21,23,31,33                              |
| 17                                      | 8.8        | Improper Integrals  | 39,43,45,51,55,57,59,63,65,67,71,73                         |
| 18                                      | 10.1       | Sequences   | 3,7,9,15,17,21,23,25,35,39,41,45,<br>49,53,55               |
| 19                                      | 10.1/10.2  | Finish Sequences; start Infinite Series                             | Section 10.1: 57,65,69,71,79,89,91,<br>97,99,109            |
| 20                                      | 10.2       | Infinite Series   | 3,5,7,13,29,33,35,41,45,47,57,59,63,<br>65,69,77,79,98      |
| 21                                      | 10.3       | Integral Test   | 3,6,9,13,15,21,27,29,31,33,35,37,55,57                      |
| 22                                      |            | <b>REVIEW FOR EXAM #2</b>   |   |
| 23                                      | 10.4       | Comparison Tests  | 1,5,18,19,21,23,25  |
| 24                                      | 10.4       | Finish Comparison Tests; start Ratio and<br>Root Tests              | Section 10.4: 28,31,32,34,37,39,41,43,<br>47,51,58          |
| <b>SPRING BREAK MARCH 12 - MARCH 20</b> |            |   |   |
| 25                                      | 10.5       | Ratio and Root Tests  | 5,7,9,18,19,21,29,31,35,42,57,59,61,70                      |
| 26                                      | 10.6       | Alternating Series, Absolute vs.<br>Conditional Convergence         | 5,7,9,10,11,13,15,19,21,23,25                               |
| 27                                      | 10.6       | Alternating Series, Absolute vs.<br>Conditional Convergence         | 27,34,35,37,39,41,44,47,51,53,63,71,73                      |
| 28                                      | 10.7       | Power Series  | 3,5,9,11,15,19,21,23,27                                     |
| 29                                      | 10.7       | Power Series  | 31,37,39,43,45,53,54  |
| 30                                      | 10.8       | Taylor and Maclaurin Series   | 3,5,8,9,11,15,18,25,31,33,37                                |
| 31                                      | 10.9       | Convergence of Taylor Series  | 1,9,10,13,15,21,22,27                                       |
| 32                                      | 10.9/10.10 | Finish Convergence of Taylor Series; start<br>Binomial Series       | Section 10.9: 31,39,41,43,45,47,53                          |
| 33                                      | 10.10      | Binomial Series and Applications of Taylor<br>Series                | 1,3,5,13,23,25,29,31,35,39,45,49,55,61                      |
| 34                                      | 11.1       | Parametrizations of Plane Curves                                    | 1,3,5,7,9,16  |

|    |           |  |  |
|----|-----------|--|--|
| 35 | 11.1/11.2 | Finish Parametrization of Plane Curves;<br>start Calculus with Parametric Curves | Section 11.1 29,31,35,37,41,43,49      |
| 36 |           | <b>REVIEW FOR EXAM #3</b>  |  |
| 37 | 11.2      | Calculus with Parametric Curves  | 7,9,12,13,15,21,26,28,29,31,33,35      |
| 38 | 11.3      | Polar Coordinates  | 1,5,7,13,17,23,27,32,37,47,51,59,60,61 |
| 39 | 11.4      | Graphing in Polar Coordinates  | 1,7,9,13,17,19,29,31                   |
| 40 | 11.5      | Areas and Lengths in Polar Coordinates   | 1,7,11,13,15,17                        |
| 41 | 11.5      | Areas and Lengths in Polar Coordinates   | 21,23,27,28                            |
| 42 |           | <b>Review for Final</b>  |  |
|    |           | <b>FINAL EXAM</b>  |  |

*Updated by Professor J. Bechtold - 1/5/2022  
Department of Mathematical Sciences Course Syllabus, Spring 2022*