

MATH 335-002: Vector Analysis

Spring 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: Algebra and calculus of vectors. Topics include the theorems of Gauss, Green, and Stokes, and curvilinear coordinates. Effective From: Spring 2009.

Number of Credits: 3

Prerequisites: Math 211 with a grade of C or better or Math 213 with a grade of C or better.

Course-Section and Instructors

| Course-Section | Instructor |
|----------------|-------------------------------|
| Math 335-002 | Professor Professor T. Askham |

Office Hours for All Math Instructors: [Spring 2019 Office Hours and Emails](#)

Required Textbook:

| | |
|-----------|--------------------------------|
| Title | <i>Vector Calculus + Notes</i> |
| Author | Paul C. Matthews |
| Edition | Corrected 2000 Edition |
| Publisher | Springer |
| ISBN # | 978-3540761809 |

University-wide Withdrawal Date: The last day to withdraw with a **W** is **Monday, April 8, 2019**. It will be strictly enforced.

COURSE GOALS

Course Objectives

- Develop better understanding of key concepts concerning scalar and vector fields learned previously in Multivariable Calculus courses.

- Gain deeper knowledge of multivariate differentiation operations such as Gradient, Divergent and Curl.
- Master the Integral Theorems at the core of Vector Analysis: the Stokes (Greens') Theorem and the Divergence (Gauss') Theorem.
- Learn the utility of Vector Analysis by learning its relevance to Maxwell's equations describing the dynamics of electric and magnetic fields.

Course Outcomes

- Students are prepared for further study in the relevant technological disciplines and more advanced mathematics courses.
- Students can apply their knowledge of Vector Analysis to solve problems in engineering and the natural sciences.

Course Assessment: The assessment of objectives is achieved through homework assignments, regular in-class quizzes, and the midterm and final examinations.

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 + Quizzes | 15% |
| Midterm Exam I | 25% |
| Midterm Exam II | 25% |
| Final Exam | 35% |

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

| | | | |
|----|----------|---|---------|
| A | 88 - 100 | C | 62 - 67 |
| B+ | 82 - 87 | D | 55 - 61 |
| B | 75 - 81 | F | 0 - 54 |
| C+ | 68 - 74 | | |

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 and Quizzes: Homework problem sets will be emailed by the instructor after each class. Homework is due on the assigned date; late homework will reduce the number of points awarded, and will only be accepted at discretion of the instructor. Two in-class quizzes will be given on an announced topic.

Exams: There will be two midterm exams held in class during the semester and one comprehensive final exam. Exams are held on the following days:

| | |
|-------------------|-------------------|
| Midterm Exam I | February 14, 2019 |
| Midterm Exam II | March 28, 2019 |
| Final Exam Period | May 10 - 16, 2019 |

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

Math Tutoring Center: Located in the Central King Building, Lower Level, Rm. G11 (See: [Spring 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](tel: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/studentssuccess/disability-support-services/>

Important Dates (See: [Spring 2019 Academic Calendar](#), [Registrar](#))

| Date | Day | Event |
|---------------------|---------|--|
| January 22, 2019 | T | First Day of Classes |
| February 1, 2019 | F | Last Day to Add/Drop Classes |
| March 17 - 24, 2019 | Su - Su | Spring Recess - No Classes, NJIT Open |
| April 8, 2019 | M | Last Day to Withdraw |
| April 19, 2019 | F | Good Friday - No Classes, NJIT Closed |
| May 7, 2019 | T | Friday Classes Meet/ Last Day of Classes |
| May 8 & 9, 2019 | W & R | Reading Days |
| May 10 - 16, 2019 | F - R | Final Exam Period |

Course Outline

| Date | Sections | Topics | Assignment |
|------|----------|--------|------------|
| | | | |

| | | | |
|-----------------|-----------|--|-----------------|
| 1/22 | 1.1 -1.3 | Vectors, Scalars and Dot Product | Selected Probs. |
| 1/24 | 1.4 -1.6 | Triple Products, Scalar and Vector Fields | Selected Probs. |
| 1/29 | 2.1 | Methods of Integration and Examples | Selected Probs. |
| 1/31 | 2.2 | Line Integrals | Selected Probs. |
| 2/5 | 2.3 - 2.4 | Surface and Volume Integrals with Examples | Selected Probs. |
| 2/7 | 3.1 - 3.2 | Partial Differentiation, Taylor Series and Gradients | Selected Probs. |
| 2/12 | 3.3 | Divergence + REVIEW for EXAM I | Selected Probs. |
| 2/14 | ----- | EXAM I | ----- |
| 2/19 | 3.3 - 3.4 | Divergence, Laplacian and Curl | Selected Probs. |
| 2/21 | 4.1 - 4.3 | Suffix Notation, Kronecker Delta and Alternating Tensor | Selected Probs. |
| 2/26 | 4.4 - 4.7 | Relations Among and Properties of Vector and Tensor Operations | Selected Probs. |
| 2/28 | 5.1 | Gauss' Divergence Theorem and Applications | Selected Probs. |
| 3/5 | 5.2 | Stokes' Theorem and Applications | Selected Probs. |
| 3/7, 3/12, 3/14 | Notes | More on Gauss' and Stokes' Theorems | Selected Probs. |
| 3/17 - 3/24 | | SPRING BREAK | |
| 3/26 | 6.1 | Curvilinear Coordinates + REVIEW for EXAM II | Selected Probs. |
| 3/28 | ----- | EXAM II | ----- |
| 4/2 | 6.1 - 6.2 | Gradient, Divergence and Curl in Curvilinear Coordinates | Selected Probs. |
| 4/4 | 6.3 - 6.4 | Examples in Cylindrical and Spherical Coordinates | Selected Probs. |
| 4/9 | 7.1 - 7.2 | Tensors | Selected Probs. |
| 4/16 | 7.3 | Tensors and Applications | Selected Probs. |
| 4/18 | Notes | Tensors and Applications | Selected Probs. |
| 4/19 | ----- | GOOD FRIDAY | ----- |
| 4/23 | 7.4 | Physical Applications of Tensors | Selected Probs. |
| 4/25 | 8.1 - 8.2 | Applications - Heat Transfer and Electromagnetics | Selected Probs. |
| 4/30 | 8.3 - 8.4 | Continuum Mechanics and Stress Tensor | Selected Probs. |
| 5/2 | 8.5 | Fluid Mechanics | Selected Probs. |
| 5/7 | ----- | REVIEW FOR FINAL EXAM | ----- |

*Updated by Professor T. Askham - 1/21/2019
Department of Mathematical Sciences Course Syllabus, Spring 2019*
