# MATH 221: Calculus III

**Course Information**

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| Semester | : June 28, 2021 – July 30, 2021 |
| Credit | : 4 |
| Teaching Hours | : 50 Hours |
| Location | : Online |
| Professor | : Sheiba MAS-OUD |
| Email | : smasoud@framingham.edu |

## Course Description:

MATH 221 Calculus III –
A study of conic sections; vectors in two and three dimensions; dot and cross products and their applications to geometry; equations of lines and planes; quadratic surfaces; polar, cylindrical, and spherical coordinates; and functions of several variables, partial derivatives, differentials, directional derivatives, gradients, optimization problems, multiple integrals and their applications.

Prerequisite: MATH 220 Calculus II with a minimum grade of C (2.00) or higher.
1.000 Credit hours
4.000 Lecture hours

## Required Textbook/Materials/Website:
Textbook: Calculus, by Briggs, Cochran, Gillet, Schulz;
         Pearson Publishing, 3rd edition,© 2019
Materials: Graphing calculator (recommend a TI-83/84 plus calculator)
Website: Access to www.mymathlab.com. The course **ID is sheiba60119**
**E-Textbook**: All required for this course, MATH 221 is the e-textbook via MyMathLab.

## Student Learning Outcomes & Instructional Objectives:

This course is designed to achieve the following student outcomes and objectives:
- Graph and analyze parametric equations.
- Evaluate derivatives of parametric equations.
- Plot polar equations using the Cartesian-to-polar method.
- Evaluate the slopes of the lines tangent to polar equations.
- Identify and graph the equation in rectangular and polar coordinates of the Ellipse, Parabola, and Hyperbola.
- Evaluate vector operations in terms of components in the plane and in three dimensions.
- Apply vectors to describe velocities and forces.
- Define Dot Products and Cross Products.

- Find the orthogonal projection of one vector onto another.
- Find parametric equations for lines and curves in space.
- Compute the derivative, definite, and indefinite integral of a Vector Valued Function.
- Use the derivative rules for Vector Valued Functions.
- Find the velocity and acceleration from position in two and three dimensions.
- Evaluate the length of curves.
- Calculate the curvature for vector valued functions.
- Find the Unit Tangent Vector and the Principal Unit Normal Vector.
- Find the equation of planes.
- Define and sketch Cylinders and Quadric Surfaces.
- Sketch and find level curves and level surfaces.
- Calculate the limit of a function of two and three variables.
- Evaluate partial derivatives and higher-order partial derivatives.
- Apply the chain rule with one and several independent variables.
- Evaluate directional derivatives and the gradient.
- Calculate the equation for tangent planes to surfaces.
- Solve maximum/minimum problems using the second derivative test.
- Apply the method of the Lagrange Multipliers with two and three independent variables.
- Evaluate double integrals over general regions.
- Calculate double integrals in polar coordinates.
- Evaluate triple integrals in cylindrical and spherical coordinates.
- Use integrals for mass calculations.
- Calculate the Jacobian of a transformation of two and three variables.
- Apply the Change of Variables in Multiple Integrals.
- Sketch vector fields.
- Evaluate line integrals.
- Use correctly the test for Conservative Vector Fields.
- Apply Green's Theorem in circulation form and flux form.
- Calculate the Divergence and Curl of a vector field.
- Evaluate Surface Integrals.
- Apply Stokes' Theorem.
- Apply the Divergence Theorem. Work with Taylor Series.

## Teaching Procedures:

This Course be delivered Synchronously via MyMathLab (at a schedule time, once a week) and asynchronously (materials reviewed on student's own schedule) on blackboard and MyMathlab. Recorded zoom meetings will be saved and posted on Bb for later review. In addition, video links and power point slides would emailed to students prior to scheduled zoom lecture. You will be given homework assignments on MyMathLab to be completed by the due dates/times each week.

Since this class is remote/online, certain considerations need to be made. You will have to be self-motivated in order to be successful in this class. You will also be required to learn on your own for much of the material unless you seek help from me or outside tutoring help.

## Attendance:

Furthermore, to be counted as having attended this class for each week, you will need to be actively using MyMathLab for instructional videos and working assignments online every week. You will communicate with your instructor through zoom and email throughout the semester. Please respond to instructor's emails in a timely manner. Attendance is a must to be able to do well in this class.

## Course Outline

### Parametric and Polar Curves
- Parametric Equations
- Polar Coordinates
- Calculus in Polar Coordinates
- Conic Sections

### Vectors and Vector-Valued Functions
- Vectors in the Plane
- Vectors in Three Dimensions
- Dot Products
- Cross Products
- Lines and Curves in Space
- Calculus and Vector Valued Functions
- Motion in Space
- Length of Curves
- Curvature and Normal Vectors

### Functions of Several Variables
- Planes and Surfaces
- Graphs and Level Curves
- Limits and Continuity
- Partial Derivatives
- The Chain Rule
- Directional Derivatives and the Gradient
- Tangent Planes and Linear Approximations
- Maximum/Minimum Problems
- Lagrange Multipliers

### Multiple Integration
- Double Integrals and Rectangular Regions

- Double Integrals over General Regions
- Double Integrals in Polar Coordinates
- Triple Integrals
- Triple Integrals in Cylindrical and Spherical Coordinates
- Integrals for Mass Calculations
- Change of Variables in Multiple Integrals

**Vector Calculus**
- Vector Fields
- Line Integrals
- Conservative Vector Fields
- Green's Theorem
- Divergence and Curl
- Surface Integrals
- Stokes' Theorem
- Divergence Theorem

## Assessment

Students will be assessed in various ways, including, tests, homework, and a cumulative final exam. Remember, your written work is a reflection of your effort in this course and therefore, all work is to be written legibly, with scratch work done on separate paper.

## Tentative Assignments/Quizzes/Tests Schedule

| June 28 | Introduction |
|---|---|
| 6/28-7/04 | Chapt 12 |
| 7/5 - 711 | Chapt 13&14 |
| 7/5-7/11 | *Test 1* |
|  |  |
| July 12 | Chapt 15 |
| 7/12-7/18 | Chapt 15 |
| 7/15-7/18 | *Chapt 15* |
| 7/17-7/18 | *Test 2* |
|  |  |
| July 19 | Chapt 16 |
| 7/19-7/25 | Chapt 16 |
| 7/21-7/25 | *Test 3* |
| July 26 | Chapt 17 |
| 7/26-7/30 | Chapt 17 |

| *What chapters will be on the Exams?* | |
|---|---|
| **Test 1** | **Chapters 12, 13** |
| **Test 2** | **Chapters 14, 15** |
| **Test 3** | **Chapters 16** |
| **Final Exam** | **Comprehensive – July 30th** |

## Grading Breakdown:

35% - Homework
30% - Three Tests (No Make Up but will drop the lowest at the end of the semester)
25% - Cumulative Final Exam (No Make Up)
10% - Attendance

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|---|---|---|---|---|---|---|
| A | 95 – 100 | B – | 80 – 82 | D + | 67 – 69 |
| A – | 90 – 94 | C + | 77 – 79 | D | 63 – 66 |
| B + | 87 – 89 | C | 73 – 76 | D – | 60 – 62 |
| B | 83 – 86 | C – | 70 – 72 | F | 0 – 59 |

## Student Responsibilities and Expectations

- **All homework** assignments, quizzes and tests will be, assigned and graded on MyMathLab. Students are able to see their scores and progress directly on MML anytime via the Gradebook.
- You would receive emails and brief announcements via MyMathLab and Blackboard on a regular basis to keep you informed of what you should be working on.

- **Weekly emails** will be sent to students who may be falling below average as a wakeup call and remind them of help options available for catching up to expectations. .
- **3 Tests**: Only one attempt with a possibility of reviewing after the due date. However, if a student's test is disrupted due to possible technology issues he/she must contact me immediately for a possible reset in at least two hours before it expires.
- **Final Exam**: Only one attempt and could not be reviewed after submission. However, if a student's exam is disrupted due to possible technology issues he/she must contact me immediately for a possible reset at any time during the testing period. To minimize improper assistance during tests/final exam, students are expected to take test/exam at the same time/date while logged into zoom with audio/video turned on and would try confirm any technological disruptions whenever they may occur.
- Homework will be assigned progressively. It is important that students keep on top of the course material, so homework must be done when assigned. Please note that completion of all homework assignments in a timely manner is necessary to reinforce the skills learned in class that day.

- Missing an exam is a *serious* matter. In the event a student must miss an exam because of circumstances beyond his/her control, it is imperative that the student contacts the instructor before the scheduled exam, or before the next class following the exam. Once a graded exam has been returned to the class, it is not possible for a student to make it up.
- Class participation and attentiveness to the pace of this course will be considered an integral part of this course.

## Disability Statement:

"Framingham State University offers equal opportunities to all qualified students, including those with disabilities and impairments. The University is committed to making reasonable accommodations as are necessary to ensure that its programs and activities do not discriminate, or have the effect of discriminating, on the basis of disability. Academic Support serves students with learning and psychiatric disabilities as well as students with visual, mobility and hearing impairments. For further information about this, please visit the website at https://www.framingham.edu/academics/center-for-academic-success-andadvising/ or contact Ms. LaDonna Bridges, Director of Academic Support/Disability Services, in the Center for Academic Support and Advising (CASA) at 508-626-4906 or lbridges@framingham.edu."

## Academic Honesty and Plagiarism:

Our purpose in the classroom is to seek the truth; this work requires trust and honesty between teacher and student. If we are not honest about what we know and don't know, our learning will always be impaired. Because our teaching and learning depends on this honest communication, we expect all students to understand what plagiarism is and why it is unacceptable.
Plagiarism means taking someone else's ideas or words and presenting them as one's own. The offense can take many forms including cheating on a test, passing in a paper taken from the Internet or from another student, or failing to properly use and credit sources in an essay. Sometimes the issue is subtle, involving getting too much help on an assignment from someone else. In every instance, plagiarism means cheating both oneself and the owner of the source. Since the cheating sabotages a student's learning experience, consequences range from no credit for the assignment to failure for the course and possible expulsion from the college.
For further information concerning plagiarism, refer to the FSU Student Handbook.

## Copyright Law

U.S. Copyright Law - For all courses that use Blackboard, please include the following statement on your syllabus: "This course website may contain copyrighted materials that are used in compliance with U.S. Copyright Law. Under that law, materials may not be saved to your computer, revised, copied, or distributed without permission. They are to be used in support of instructional activity as part of this course only and shall be limited to the duration

of the course, unless otherwise specified by the instructor or owner of the material. You may only download or print materials at the direction of your instructor who knows which materials are copyrighted and which are not."

**Frequently Asked Questions by Students:**

- *Can I turn in late homework?*
    - Yes, you can. But there is a 30% reduction in your potential earned points for the questions that are past due. Also, homework assignments will not remain available for the entire semester. Once an exam is given, the homework assignments that cover the exam's material will be closed for the remainder of the semester.
- *Can I make up a missed quiz?*
    - No, you cannot take a missed quiz, no matter what the reason. However, the lowest quiz score will be dropped at the end of the semester.
- *Can I make up a missed test?*
    - No, you cannot take a missed test, no matter what the reason. However, the lowest quiz score will be dropped at the end of the semester.
- *Do you give "retakes" on tests or quizzes?*
    - No, I do not. You only get one (1) chance at each quiz or each test.
- *Do you give Extra Credit in this course?*
    - This question often gets asked towards the end of the semester. No, extra credit is *not* given for this course. To earn the highest possible grade, you should read your textbook, complete all homework assignments on time, be ready for quizzes and exams. You will not be allowed to do extra work to boost your grade.
- *What are the consequences for cheating?*
    - Failure of the quiz or test. Or worse – failure of the course. Simply don't cheat.
- *What should I do if I'm struggling with my homework?*
    - Email me right away, by clicking on the "Ask Your Teacher" link on MyMathLab. I will reply as quickly as I can.
    - Watch YouTube videos. Search for what you're struggling with.
- *Can any calculator be used for this course?*
    - In short, yes, any calculator can be used for this course. However, you'll find that a graphing calculator will be very helpful to you, requiring less memorization of formulas, although formulas can/will be provided if needed.