**CALCULUS & ANALYTIC GEOMETRY III**  MA3330

Departmental Syllabus


**Prerequisite:** MA2320 Calculus & Analytic Geometry II - Grade of C or higher

**COURSE DESCRIPTION:** We will continue with the Calculus from MA2320. We will study three main areas. The first is vector algebra and geometry of three-dimensional space including: lines, planes, and curves in space; polar, cylindrical, and spherical coordinate systems. Then using this geometry we learn limits, partial differentiation, directional derivatives, max-min theory and Lagrange Multipliers. The final area of study is integration, including double, triple integrals, line integrals, and the divergence, Green’s and Stokes Theorems.

**GOALS & OBJECTIVES:** After successful completion of this course students should understand the algebra of vectors, meaning of limits, continuity, and derivatives of functions of two or three variables and double and triple integrals and green's Theorem. Also be able to use these skills to solve a variety of problems.

**COURSE EVALUATION & GRADING:** Course grade will be based on midterm exams, quizzes, assignments, and Final Exam. The Final exam is **cumulative** and it counts at least **30%** of the course grade. The grading scale is as follows:

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<thead>
<tr>
<th>Grade</th>
<th>Points</th>
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<tr>
<td>A</td>
<td>[94, 100]</td>
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<tr>
<td>A-</td>
<td>[90, 93]</td>
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<td>B+</td>
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<td>B</td>
<td>[84, 86]</td>
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<td>B-</td>
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<td>C+</td>
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<td>C</td>
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<td>C-</td>
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<td>D+</td>
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<td>[60, 63]</td>
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<td>F</td>
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**TUTORIAL:** Drop-in tutorial is available in the Mathematics Learning Center

**ACCOMMODATIONS FOR STUDENTS WITH SPECIAL NEEDS:** If you have or suspect you may have a physical, psychological, medical or learning disability that may impact your course work, please contact Stacey DeFelice, Director, The Office of Services for Students with Disabilities (OSSD), NAB, 2065, Phone: 516-628-5666, Fax (516) 876-3005, TTD: (516) 876-3083. E-mail: defelices@oldwestbury.edu. The office will help you determine if you qualify for accommodations and assist you with the process of accessing them. All support services are free and all contacts with the OSSD are strictly confidential.
TOPICS TO BE COVERED


PARAMETRIC EQUATIONS AND POLAR COORDINATES
10.1 Curves Defined by Parametric Equations.
10.2 Calculus with Parametric Curves.
10.3 Polar Coordinates.
10.4 Areas and Lengths in Polar Coordinates.
10.5 Conic Sections.
10.6 Conic Sections in Polar Coordinates.

VECTORS AND THE GEOMETRY OF SPACE
12.1 Three-Dimensional Coordinate Systems.
12.2 Vectors.
12.3 The Dot Product.
12.4 The Cross Product
12.5 Equations of Lines and Planes.
12.6 Cylinders and Quadric Surfaces.

VECTOR FUNCTIONS (Selected topics including: arc length and representation of velocity and acceleration)
13.1 Vector Functions and Space Curves.
13.2 Derivatives and Integrals of Vector Functions.
13.3 Arc Length and Curvature.
13.4 Motion in Space: Velocity and Acceleration.

PARTIAL DERIVATIVES
14.1 Functions of Several Variables.
14.2 Limits and Continuity.
14.3 Partial Derivatives.
14.4 Tangent Planes and Linear Approximation.
14.5 The Chain Rule.
14.6 Directional Derivatives and the Gradient Vector.
14.7 Maximum and Minimum Values.
14.8 Lagrange Multipliers.

MULTIPLE INTEGRALS
15.1 Double Integrals over Rectangles.
15.2 Iterated Integrals.
15.3 Double Integrals over General Regions.
15.4 Double Integrals in Polar Coordinates.
15.5 Applications of Double Integrals.
15.6 Surface Area
15.7 Triple Integrals
15.8 *Triple Integrals in Cylindrical Coordinates
15.9 *Triple Integrals in Spherical Coordinates
15.10 *Change of Variables in Multiple Integrals

VECTOR CALCULUS.
16.1 Vector Fields
16.2 Line Integrals
16.3 The Fundamental Theorem for Line Integrals
16.4 Green’s Theorem
16.5 *Curl and Divergence
16.6 *Parametric Surfaces and Their Areas
16.7 *Surface Integrals
16.8 *Stokes’ Theorem

* These topics are covered and selected by instructor's choice.