



DEPARTMENT OF MATHEMATICS AND COMPUTER & INFORMATION SCIENCE

CALCULUS & ANALYTIC GEOMETRY III MA3330

Departmental Syllabus

TEXTBOOK: **Multivariable Calculus** by James Stewart, 7th Edition, 2011, ISBN-13: **9780538497879**

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:

A = [94, 100] A ⁻ = [90, 93]	B ⁺ = [87, 89]	C ⁺ = [77, 79]	D ⁺ = [67, 69]	F = [0, 59]
	B = [84, 86]	C = [74, 76]	D = [64, 66]	
	B ⁻ = [80, 83]	C ⁻ = [70, 73]	D ⁻ = [60, 63]	

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

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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.