



Department of Mathematics, Computer & Information Science

**CALCULUS & ANALYTIC GEOMETRY III
MA3330 • SYLLABUS FALL 2014**

Professor: **Frank Sanacory**

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Office Hours: MTW 1:00PM – 2:30PM

Course Web Site: sanacory.net

TEXTBOOK: **Multivariable Calculus** by James Stewart , 2011, ISBN-13: 978-0538497879.

PREREQUISITES: MA2320: Calculus & Analytic Geometry II.

COURSE DESCRIPTION: We will continue with the Calculus from MA 2320. 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.

COURSE 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: Your grade for the course will be based on your homework/quiz performance and a computer project (20%), two tests (45%) and a comprehensive final exam (35%).

CALCULATOR: No calculator is allowed.

TUTORIAL: Drop-in tutorial is available in the Mathematics Learning Center in **H211a**.

ACCOMMODATIONS FOR STUDENTS WITH SPECIAL NEEDS: If you have, or suspect you may have a physical, psychological, medical or learning disability that may impact how you function academically and/or your access to activities on campus, please contact Dr. Lisa Whitten, Director of the Office of Services for Students with Disabilities (OSSD). She will determine whether or not you qualify for academic accommodations and arrange them with your professors if you do. The OSSD is located in the NAB, Room 2064. You can reach Dr. Whitten at 516-876-3009 or whittenl@oldwestbury.edu.

RESPECT: No cell phones in class and no texting.

FINAL EXAM: Will be held Wednesday, December 17, in our regular classroom at the regular class time.

TOPICS TO BE COVERED

Ch 10: PARAMETRIC EQUATIONS AND POLAR COORDINATES.

- 10.1 Curves Defined by Parametric Equations. Laboratory Project: Families of Hypocycloids.
- 10.2 Calculus with Parametric Curves. Laboratory Project: Bézier Curves.
- 10.3 Polar Coordinates. Laboratory Project: Families of Polar Curves.
- 10.4 Areas and Lengths in Polar Coordinates.
- 10.5 Conic Sections.
- 10.6 Conic Sections in Polar Coordinates. Review. Problems Plus.

Ch 12: 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. Discovery Project: The Geometry of a Tetrahedron.
- 12.5 Equations of Lines and Planes.
- 12.6 Cylinders and Quadric Surfaces. Review. Problems Plus.

Ch 13. VECTOR FUNCTIONS.

- 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. Applied Project: Kepler's Laws. Review. Problems Plus.

Ch 14. 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. Applied Project: Designing a Dumpster. Discovery Project: Quadratic Approximations and Critical Points.
- 14.8 Lagrange Multipliers. Applied Project: Rocket Science. Applied Project: Hydro-Turbine Optimization. Review. Problems Plus.

Ch 15. 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.
- 15.10 Change of Variables in Multiple Integrals. Review. Problems Plus.

Ch 16. 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.