

Naugatuck Valley Community College
STEM Division
Science, Technology, Engineering and Mathematics

Common Course Syllabus
Calculus III MAT*H268

COURSE TITLE: Calculus III: Multivariable, MAT*H268

COURSE DESCRIPTION: A course in multivariable calculus for math or science majors. Topics include with conic sections, plane curves, parametric equations and polar coordinates, vectors and solid analytic geometry, vector-valued functions, functions of several variables, partial differentiation, and multiple integration.

NUMBER OF CREDITS: 4 credit hours

PREREQUISITE: Grade of "C" or better in MAT*H256 (Calculus II).

COURSE OBJECTIVES:

1. Acquire an understanding of the properties and arithmetic of vectors.
2. Develop the ability to apply differential and integral calculus methodology in multiple dimensions.
3. Acquire an understanding of concepts such as optimization and volume in multiple dimensions.
4. Develop an understanding of the language, theorems, and methods of vector analysis especially as they relate to the evaluation of line integrals.

LEARNING OUTCOMES: At the end of this course the student will be able to do the following:

- A. Conic Sections (Review) —
 1. Write equations of parabolas, ellipses, and hyperbolas in standard form.
 2. Graph conic sections.
- B. Plane Curves, Parametric Equations, and Polar Coordinates —
 1. Define a plane curve.
 2. Sketch graphs of parametric equations.
 3. Eliminate parameters.
 4. Find parametric equations for a graph.
 5. Find the derivative in parametric form.
 6. Find arc length and areas of surfaces of revolution.
 7. Plot points and graphs using polar coordinates.
 8. Find slope in polar form.
 9. Find area and arc length in polar coordinates.
 10. Solve applied problems.

C. Vectors —

1. Plot vectors in two and three dimensions.
2. Find the length and direction of a vector.
3. Find sums and differences of vectors.
4. Calculate the dot product.
5. Define a vector-valued function.
6. Find limits of, differentiate, and integrate vector-valued functions.
7. Calculate the cross product of two vectors.
8. Graph lines, planes, surfaces, curves, and vector-valued functions in space.
9. Solve applied problems.

D. Functions of Several Variables —

1. Define functions of two and three variables.
2. Find the domain of a function of several variables.
3. Sketch the graph of a function of two variables.
4. Find the limit of a function of two variables.
5. Discuss the continuity of functions of two and three variables.
6. Take partial derivatives of functions of several variables.
7. Find differentials of functions of several variables.
8. Use the chain rule and implicit partial differentiation.
9. Find directional derivatives and gradients.
10. Find equations for tangent planes and normal lines to surfaces.
11. Find extrema of functions of two variables.
12. Solve optimization problems.

E. Multiple Integration —

1. Integrate with respect to a given variable.
2. Find areas by iterated integrals.
3. Evaluate double integrals.
4. Find volumes by double integrals.
5. Find areas of polar regions.
6. Calculate mass, center of mass, and moments of inertia.
7. Use multiple integration to calculate surface area.
8. Evaluate triple iterated integrals and apply results to finding volumes, centers of mass, and moments of inertia.

F. Vector Analysis —

1. Define and sketch vector fields.
2. Find the curl and divergence of a vector field.
3. Evaluate line integrals and use the fundamental theorem of line integrals.
4. Use Green's Theorem to evaluate line integrals.
5. Define and sketch parametric surfaces.
6. Find the area of a parametric surface.
7. Evaluate surface integrals.
8. Use the Divergence Theorem to evaluate integrals.
9. Use Stokes's Theorem to evaluate integrals.

GRADING SYSTEM: For the purpose of computing numerical credit point averages, grades are evaluated as follows for each semester hour of credit. Grades on exams, papers, and quizzes, will be based on this grading system.

Numeric Grade	Acceptable Letter Grade Range to be used by the instructor	Description
90 – 100	A– to A	Excellent
80 – 89	B–, B, B+	Above Average
70 – 79	C–, C, C+	Average
60 – 69	D–, D, D+	Below Average
Below 60	F	Failing

CLASS

CANCELLATION PROCEDURE: *If the instructor is late, the class is expected to wait 15 minutes before leaving or until informed of a cancellation by a college official. Information on weather related closings/late openings concerning Naugatuck Valley Community College can be obtained through local radio and television stations, or via the college website (<http://www.nvcc.commnet.edu>). NOTE: An alternative assignment may be given if classes are canceled due to weather.*

ACADEMIC HONESTY STATEMENT: *At NVCC we expect the highest standards of academic honesty. Academic dishonesty is prohibited in accordance with the Board of Trustee's Proscribed Conduct Policy in Section 5.2.1 of the BOT Policy Manual. This policy prohibits cheating on examinations, unauthorized collaboration on assignments, unauthorized access to examinations or course materials, plagiarism, and other proscribed activities. Plagiarism is defined as the use of another's idea(s) or phrase(s) and representing that/those idea(s) as your own, either intentionally or unintentionally. Anyone who is caught cheating on exams, plagiarizing another's work or published material will fail the course regardless of progress made in the course.*

CHILDREN ON CAMPUS: *With permission of the instructor only – Children must be attended at all times by a responsible adult. The student must notify the instructor or supervisor prior to the beginning of the class or activity that a child is present. Instructors and/or supervisors are authorized to ask the student or program participants to leave should the presence of a child be disruptive.*

CELL PHONE/PAGER USE POLICY: *Students are hereby notified that cellular phones and beepers are allowed in class only if they are turned off or turned to a silent mode. Under no circumstances are telephones to be answered in class. Students who ignore this policy may be asked to leave class. When there are extenuating circumstances that require that a student be available by phone or beeper, the student should speak to the instructor prior to class, so that together they can arrive at an agreement concerning the device.*

STUDENTS WITH SPECIAL NEEDS: *Students who may require accommodations on the basis of a learning disability are encouraged to contact the Coordinator of Learning Disabilities. Students who may require accommodations on the basis of all other disabilities should contact the Coordinator of Disability Services. After providing documentation and completing the disability disclosure process, students are then encouraged to meet with their instructor(s) to discuss the accommodations approved by the appropriate Coordinator and to complete the Accommodations Agreement form. Accommodations are not retroactive, students are therefore encouraged to meet with their instructor(s) at the beginning of each semester. Instructors, in conjunction with appropriate college personnel, will provide assistance and/or accommodations only to those students who have completed the disability disclosure and accommodations process.*