

# North Hennepin Community College

## MATH 2220: Calculus III

### A. COURSE DESCRIPTION

Credits: 5

Lecture Hours/Week: \*.\*

Lab Hours/Week: \*.\*

OJT Hours/Week: \*.\*

Prerequisites:

This course requires either of these prerequisites

A score of 3 on test Adv Placement Calculus BC

MATH 1222 - Calculus II (Minimum grade: 1.67 GPA Equivalent)

Corequisites: None

MnTC Goals: Goal 04 - Mathematical/Logical Reasoning

Topics in this course include solid analytic geometry, vectors in space, scalar and vector products, vector functions and derivatives/integrals, multi-variable functions, partial derivatives, alternative coordinate systems, and double and triple integrals. The geometry of space curves, line and surface integrals, curl and gradient divergence, and Stokes' theorem are also included. Emphasis will be on learning relevant mathematical methods.

Prerequisites: Successful completion of Math 1222 with a grade of "C" or better

**B. COURSE EFFECTIVE DATES:** 08/27/1997 - Present

### C. OUTLINE OF MAJOR CONTENT AREAS

1. See Course Description and Course Outcomes

### D. LEARNING OUTCOMES (General)

1. Explain the concepts of limits and continuity for real-valued functions of two or more variables. (MnTC Goal 4: a, b, d; Goal 2: a, c); (NHCC ELOs 1, 2)
2. Find derivatives of vector-valued functions and use those derivatives to describe an object's motion. (G4: a, b, d; G2: a, b, c); (NHCC ELOs 1, 2)
3. Use partial derivatives and/or Lagrange multipliers to locate any extreme values and saddle points of a function of several variables. (G4: a, b, d; G2: a, b, c, d); (NHCC ELOs 1, 2, 4)
4. Evaluate iterated integrals using rectangular, cylindrical, and spherical coordinate systems. (G4: a, d; G2: c); (NHCC ELOs 1, 2)
5. Use triple integrals to solve problems such as calculating volume, center of mass, moments of inertia, and the expected value of a continuous random variable. (G4: a, d; G2: a, b, c, d); (NHCC ELOs 1, 2, 4)
6. Recognize vector fields. Compute and interpret curl, divergence, and flux. (G4: a, d); (NHCC ELOs 1, 2, 4)
7. Use line integrals to calculate work done by a force field in moving an object along a curve. (G4: a, d); (NHCC ELOs 1, 2, 4)
8. State and apply the Fundamental Theorem of Line Integrals, Green's Theorem, Stokes's Theorem, and the Divergence Theorem. (G4: a, b, d; G2: a, b, c, d); (NHCC ELOs 1, 2, 4)
9. Compare and contrast the generalizations of the Fundamental Theorem of Calculus listed above. (G4: a, b, d; G2: a, b, c, d); (NHCC ELOs 1, 2, 4)
10. Compute gradients and directional derivatives and apply them to finding tangent spaces and normal lines. (G4: a, d); (NHCC ELOs 1, 2, 4)

## **E. Minnesota Transfer Curriculum Goal Area(s) and Competencies**

### Goal 04 - Mathematical/Logical Reasoning

1. Illustrate historical and contemporary applications of mathematical/logical systems.
2. Clearly express mathematical/logical ideas in writing.
3. Explain what constitutes a valid mathematical/logical argument(proof).
4. Apply higher-order problem-solving and/or modeling strategies.

## **F. LEARNER OUTCOMES ASSESSMENT**

As noted on course syllabus

## **G. SPECIAL INFORMATION**

1. Knowledge of Human Cultures and the Physical and Natural World--Through study in the sciences, mathematics, social sciences, humanities, histories, languages, the arts, technology and professions.
2. Intellectual and Practical Skills--Including: Inquiry and analysis; Critical and creative thinking; Written and oral communication; Quantitative literacy; Information literacy; Teamwork and problem solving.