



**Course Name: MAT-230 Calculus III**

Date Updated: 2/2023

Credit Hours/week: 4 hrs./wk. – 4 cr.

BEGINNING: FALL 2023

Catalog Description: A continuation of Analytic Geometry and Calculus II, which includes analytic geometry in three dimensions, functions of several variables, partial derivatives, multiple integrals, vectors, and an introduction to vector analysis.

Prerequisite: MAT 132 (grade of “C” or better)

Text: Stewart, James., Clegg, Daniel., Watson, Saleem. Multivariable Calculus, 9th Ed, Cengage Learning, 2021. ISBN-10: 0357042921, ISBN-13: 9780357042922

Syllabus:

Period	Text Sections	Topics
1	12.1	3D Coordinate Systems
2	12.2	Vectors
3	12.3-4	The Dot and Cross Products
4	12.5	Equations of Lines and Planes
5	12.6	Cylinders and Quadric Surfaces
6	13.1	Vector Functions and Space Curves
7	13.2	Derivatives and Integrals of Vector Functions
8-9	13.3	Arc Length and Curvature
10	13.4	Motion in Space: Velocity and Acceleration
11-12		<b>Review Exam 1</b>
13	14.1	Functions of Several Variables
14	14.2	Limits and Continuity
15	14.3	Partial Derivatives
16	14.4	Tangent Planes and Linear Approximations
17	14.5	The Chain Rule
18	14.6	Directional Derivatives and the Gradient Vector
19	14.7	Extreme Values and Saddle Points
20	14.8	Lagrange Multipliers
21-22		<b>Review Exam 2</b>
23	15.1	Double Integrals over Rectangles
24-25	15.2	Double Integrals over General Regions
26	15.3	Double Integrals in Polar Coordinates
27	15.4-5	Applications of Double Integrals, Surface Area
28	15.6	Triple Integrals
29-30	15.7-8	Triple Integrals in Cylindrical and Spherical Coordinates
31	15.9	Change of Variables in Multiple Integrals
32-33		<b>Review Exam 3</b>
34	16.1	Vector Fields
35	16.2	Line Integrals
36	16.3	The Fundamental Theorem for Line Integrals
37	16.4	Green’s Theorem in the Plane
38	16.5	Curl and Divergence
39	16.6	Parametric Surfaces and Their Areas
40	16.7	Surface Integrals
41	16.8	Stoke’s Theorem
42	16.9	The Divergence Theorem
43		Review
44-45		<b>Final Exam</b>

Students are expected to adhere to the policies of the County College of Morris.

## **Statement of Expected Course LEARNING OUTCOMES**

- **Recognize and manipulate** vectors in two and three dimension
- **Calculate** the equations of lines and planes in three dimension
- **Recognize, classify, and illustrate** functions and surfaces in three dimension
- **Distinguish and relate** rectangular, cylindrical, and spherical coordinates
- **Calculate** limits, derivatives, and integrals of functions of several variables
- **Apply** partial differentiation to locate critical points
- **Apply** multiple integration to calculate areas and volumes
- **Define** vector fields and **calculate** line and surface integrals
- **State and interpret** Green's, Stoker's, and the divergence theorems