Course Name: MAT-131 Analytical Geometry and Calculus I   Date Updated: 6/2023

Credit Hours/week: 4 hrs./wk. – 4 cr.   BEGINNING: FALL 2023

Catalog Description: The first semester of a three-semester sequence. Analytic geometry in the plane, differentiation and applications, and integration are covered.

Prerequisite: MAT 123 (grade of "C" or better) or equivalent.

Text: Larson, Ron, and Bruce H. Edwards. Calculus of a Single Variable: Early Transcendental Functions, 8th ed. Cengage Learning, 2024

Syllabus:

Period	Text Sections	Topics
1	1.1-1.6	Review of Functions
2 – 3	2.1-2.2	Preview, Limits Graphically and Numerically
4-6	2.3-2.4	Limits, Continuity, One-Sided Limits
7	2.5	Infinite Limits
8		**Test**
9	3.1	Tangent Line Problem and the Derivative
10 – 11	3.2	Basic Differentiation, Rates of Change
12 – 13	3.3	Product and Quotient Rules, Higher Order Derivatives
14 – 16	3.4-3.5	The Chain Rule, Implicit Differentiation
17	3.6	Derivatives of Inverse Functions
18	3.7	Related Rates
19	3.8	Newton's Method
20 – 21		Review, **Midterm**
22 –23	4.1-4.2	Extrema, Rolle's Theorem, Mean Value Theorem
24 – 25	4.3	Intervals of Inc/Dec, First Derivative Test
26 – 27	4.4	Concavity, Second Derivative Test
28	4.5	Limits at Infinity
29	4.6	A Summary of Curve Sketching
30 – 31	4.7-4.8	Optimization, Differentials
32		**Test**
33	5.1	Antiderivatives, Indefinite Integration
34 – 36	5.2-5.3	Area, Riemann Sums, Definite Integrals
37	5.4	Fundamental Theorem of Calculus
38 – 39	5.5	Integration by Substitution
40	5.7	Natural Log Integration
41	5.8	Inverse Trig Integrals
42-43	5.6	Indeterminate Forms and L'Hopital's Rule
44 – 45		Review for final exam, **Final Exam**

Students should be informed that this course assumes an adequate familiarity with algebra and trigonometry and that the pace is fast.

Students are expected to adhere to the policies of the County College of Morris. These can be accessed at:
https://www.ccm.edu/academics/academic-policies/

Statement of Expected Course LEARNING OUTCOMES

- **Understand** the concepts of limits and **evaluate** limits of functions given their equations or their graphs.
- **Differentiate** functions involving algebraic and various transcendental functions.
- **Solve** basic applications of derivative problems such as distance, velocity, and acceleration, and tangent line problems and Newton's Method problems.
- **Solve** related rates, optimization problems involving various areas of study such as business, engineering, biology, chemistry, and physics.
- **Sketch** polynomial and rational functions using techniques of differentiation.
- **Use** various techniques of integration to evaluate indefinite integrals and **find** area under curves by evaluating definite integrals.