MA 1114 — SINGLE VARIABLE CALCULUS II WITH MATRIX ALGEBRA (4-0)
Objectives

Upon completion of this course, the student should be able to satisfy the following objectives.

A. INTEGRAL CALCULUS

1. Use integration to: find the area between curves; find volumes of solids of revolution; find total work done in appropriate problems; find the average value of a function.

2. Evaluate appropriate integrals by using trigonometric identities and/or trigonometric substitution.

3. Evaluate integrals of rational functions by the method of partial fractions.

4. Recognize improper integrals, determine whether they converge, and if possible, evaluate them.

B. SEQUENCES AND SERIES

5. Given a sequence, determine whether or not it converges, and if it does, find the limit.

6. Determine the convergence of a series by appropriate tests, including the ratio, comparison, and alternating series tests.

7. Find the interval of convergence for a power series.

8. Apply Taylor's Theorem to find polynomial approximations to given functions and estimate their accuracy.

C. MATRIX ALGEBRA

9. Perform arithmetic operations on complex numbers: addition, subtraction, multiplication, division, raising to powers; determine the magnitude, argument, real part, imaginary part, and complex conjugate; convert between rectangular and polar forms.

10. State and apply De Moivre's theorem; find n^{th} roots of complex numbers. State Euler's formula.

11. Find the general solution for $m \times n$ systems of linear equations using Gauss-Jordan elimination. Determine the type of solution set (inconsistent, unique solution, or infinitely many solutions) by Gauss elimination.

12. Perform algebraic operations on matrices and vectors: addition, subtraction, scalar multiplication, matrix multiplication, transposition.

13. Define and describe the basic properties of the inverse of a matrix. Find the inverse of a square matrix using Gauss-Jordan elimination.

14. Compute the determinant of a matrix either by elementary row operations or by cofactor expansion.

15. Use Cramer's rule (where applicable) to solve 2 x 2 and 3 x 3 systems of linear equations. Explain why Cramer's rule is inappropriate for large systems.

16. Find the eigenvalues and associated eigenvectors of 2 x 2 and 3 x 3 matrices, including cases of repeated or complex eigenvalues.