Course Number Course Name	Math 3311 Vector Analysis
Credit Value (Breakdown of theory and lab credits)	3 Theory
Catalog Course Description	This course will cover vector algebra, lines, planes, parametric curves, arc length, tangent and normal vectors and curvature of parametric curves, vector identities, gradients and directional derivatives, line, surface and volume integrals, divergence and curl of vector- valued functions, Gauss's and Stokes's theorems and geometric interpretations. Prerequisite: MATH 2530. (3, 3T+0L)
Course Student Learning Outcomes/Objectives /Competencies of the Course	**Student Learning Outcomes:** At the end of this course the student will be able to: 1. Add and subtract vectors graphically and algebraically. 2. Multiply a vector by a scalar graphically and algebraically. 3. Derive and apply equations of a line and equations of a plane in 3D. 4. Compute and interpret the dot and cross product of two vectors. 5. Use triple scalar products to find the volume of a parallelepiped. 6. Compute velocities, tangents, accelerations and curvatures of a curve parametrized with time. 7. Compute and interpret gradients and directional derivatives of a scalar field. 8. Understand the notion of a vector field. 9. Compute and interpret the divergence and curl of a vector field. 10. Compute the Laplacian of a scalar field. 11. Use cylindrical and spherical coordinates and convert between Cartesian coordinates. 12. Compute line integrals of conservative and non-conservative fields. 13. Compute surface and volume integrals. 14. Understand and apply the Divergence theorem. 15. Understand and apply Stokes' theorem. 16. Solve application problems e.g. vector equations of electromagnetism and Maxwell's Equations (time permitting).
College-Wide Student Learning Outcomes	Math 3311 exposes students to the following NNMC College Wide Goals: *Critical thought: Students are required to analyze and synthesize information and draw reasoned conclusions.* *Quantitative reasoning: Calculate, represent, apply, analyze, and communicate both quantitative and qualitative information.*

Program Student Learning Outcomes measured	PSLO #3: Use linear algebra and matrices, vector analysis, ordinary differential equations, partial differential equations, or complex analysis to solve real world problems.