MATH M25C: Calculus with Analytic Geometry III

Course Objectives (COR)

- Apply the basic rules of vector algebra to carry out vector operations in the plane and in space.
- Evaluate dot, cross and triple products and projections.
- Use the dot product, cross product, and triple scalar product to solve applied problems.
- Write the parametric equations and symmetric equations of a line in space and write the standard equation of a plane in space.
- Identify the six quadric surfaces.
- Compute the cylindrical and spherical coordinates of points in space.
- Evaluate derivatives and integrals of vector-valued functions.
- Compute velocity and acceleration vectors for vector-valued functions.
- Find the tangential and normal components of an acceleration vector and compute arc length and curvature of a space curve.
- Evaluate limits and determine continuity for functions of two variables at a point.
- Find the first-order and higher-order partial derivatives of functions of several variables, determine differentiability, and apply the chain rule to find partial derivatives.
- Compute the directional derivative and the gradient vector for a function of two or three variables.
- Write the equation of a tangent plane at a point on a surface.
- Find and classify all critical points for a function of two variables and use Lagrange multipliers to find maxima and minima of functions of two variables subject to side conditions.
- Use double integrals to compute areas and volumes and surface areas.
- Evaluate double integrals using polar coordinates.
- Find the center of mass of a variable density planar lamina.
- Evaluate triple integrals using rectangular, cylindrical, or spherical coordinates.
- Compute the potential function, curl, and divergence of a vector field.
- Evaluate the line integral of a vector field on a curve and surface integrals.
- Apply Green's Theorem to compute line integrals and double integrals.
- Use the Divergence Theorem to compute the flux of a vector field through a surface.
- Use Stokes' Theorem to compute the circulation of a vector field around a closed curve.

Course Learning Outcomes (CLO)

- Students completing this course will be able to calculate limit, derivative and integral of vector-valued functions.
- Students completing this course will be able to partially differentiate multi-variable functions.
- Students completing this course will be able to integrate multi-variable functions, or Apply Green's, Divergence, or Stoke's Theorems in vector fields.