Topics for MATH 2060 – Fall 2019

MATH 2060 covers material from the following sections of the Briggs (3e) textbook:

Chapter	Sections	Topics	Notes
13	§§13.1-13.6	Three-Dimensional Coordinate Systems, Vectors, Dot Product, Cross Product, Equations of Lines and Planes, Cylinders and Quadric Surfaces	
14	§§14.1-14.5	Vector Functions and Space Curves, Derivatives and Integrals of Vector Functions, Arc Length and Curvature, Motion in Space: Velocity and Acceleration	
15	§§15.1-15.8	Functions of Several Variables, Limits and Continuity, Partial Derivatives, Tangent Planes and Linear Approximations, The Chain Rule, Directional Derivatives and the Gradient Vector, Maximum and Minimim Values, Lagrange Multipliers	
16	§§16.1-16.6	Double Integrals over Rectangles, Iterated Integrals, Double Integrals over General Regions, Double Integrals in Polar Coordinates, Applications of Double Integrals, Triple Integrals, Triple Integrals in Cylindrical Coordinates, Triple Integrals in Spherical Coordinates	§16.7 is optional
17	§§17.1-17.8	Vector Fields, Line Integrals, The Fundamental Theorem for Line Integrals, Green's Theorem, Curl and Divergence, Parametric Surfaces and Their areas, Surface Integrals, Stokes' Theorem, The Divergence Theorem	

Learning Outcomes

Upon successful completion of MATH 2060, students will be able to

- Perform basic vector operations such as the dot product and cross product and utilize these operations in applications.
- Find equations of lines and planes in 3-space, and identify basic quadric surfaces and cylinders.
- Evaluate limits, derivatives, and integrals of vector-valued functions of one variable, and for the associated curves, find arc length, curvature, tangent lines, unit tangent vectors, principle unit normal vectors, and binormal vectors.
- Compute limits, partial derivatives, directional derivatives, and gradients for functions of several variables; use differentiation to determine tangent planes, relative extrema, and absolute extrema of continuous functions on closed and bounded regions for functions of several variables.
- Use Lagrange multipliers to find extrema of a function subject to one constraint.
- Evaluate multiple integrals in 2 and 3 dimensions, in various coordinate systems, and apply these integrals to calculate areas, volumes, surface areas, mass, and centers of mass.
- Evaluate line integrals, surface integrals and flux integrals directly, and be able to apply the Fundamental Theorem of Calculus for Line Integrals, and Green's Theorem, Stokes' Theorem, and the Divergence Theorem appropriately.
- Identify conservative vector fields and find potential functions for conservative vector fields.