

SOUTHEASTERN LOUISIANA UNIVERSITY
DEPARTMENT OF MATHEMATICS
MATH 312 COURSE INFORMATION SHEET
Effective August 2022

COURSE TITLE: Calculus III

CREDIT: 3 semester hours

PREREQUISITE: A grade of "C" or better in MATH 201.

CATALOGUE DESCRIPTION: The third of a standard three-course sequence on calculus. Topics include vectors and geometry of 3-space, vector-valued functions, directional derivatives, and multiple and line integrals.

COURSE OVERVIEW:

This course extends the ideas on differentiation and integration learned in single variable calculus to vector-valued functions and to multivariate functions. Applications include tangent vectors, normal vectors, arc length, curvature, directional derivatives, gradients, tangent planes, extrema of multivariate functions, volume, centers of mass, moments of inertia, and topics in vector analysis.

TEXT: *Multivariable Calculus*, 12th Edition by Larson and Edwards

PUBLISHER: Cengage Learning

ESSENTIAL TOPICS COVERED:

Based upon the current textbook, the following outline allows for 3 regular examinations and the final examination. The section numbers from the textbook are given in parentheses after each topic:

Vectors and the Geometry of Space: (3 Weeks – Chapter 11)

- Vectors in the Plane (11.1)
- Space Coordinates and Vectors in Space (11.2)
- The Dot Product of Two Vectors (11.3)
- The Cross Product of Two Vectors in Space (11.4)
- Lines and Planes in Space (11.5)
- Cylindrical and Spherical (11.7)

Vector-Valued Functions (2 Weeks – Chapter 12)

- Vector-Valued Functions (12.1)
- Differentiation and Integration of Vector-Valued Functions (12.2)
- Velocity and Acceleration (12.3)
- Tangent and Normal Vectors (12.4)

Functions of Several Variables (4.5 Weeks – Chapter 13)

- Introduction to Functions of Several Variables (13.1)
- Limits and Continuity (13.2)
- Partial Differentiation (13.3)
- Differentials (13.4)
- Chain Rule for Functions of Several Variables (13.5)
- Directional Derivatives and Gradients (13.6)
- Tangent Planes and Normal Lines (13.7)

Multiple Integration (5.5 Weeks – Chapter 14)

- Iterated Integrals and Area in the Plane (14.1)
- Double Integrals and Volume (14.2)
- Change of Variables: Polar Coordinates (14.3)
- Center of Mass and Moments of Inertia (14.4)
- Surface Area (14.5)
- Triple Integrals and Applications (14.6)
- Triple Integrals in Other Coordinates (14.7)
- Change of Variables: Jacobians (14.8)

OPTIONAL TOPICS: If time permits, some of the following sections may be covered

- Extrema of Functions of Two Variables (13.8)
- Lagrange Multipliers (13.10)
- Vector Fields (15.1)
- Line Integrals (15.2)
- Green's Theorem (15.4)