Tennessee Technological University
Mathematics Department

MATH 2110: Calculus III

I. COURSE DESCRIPTION FROM CATALOG:

Analytic geometry and vectors, differential calculus of functions of several variables, multiple integration, topics from vector calculus. Lec. 4. Cr. 4.

II. PREREQUISITE(S):

C or better in MATH 1920; or equivalent AP credit for MATH 1910 and MATH 1920.

III. COURSE OBJECTIVE(S):

To study analytic geometry, vectors, partial derivatives, multiple integration and topics from vector calculus.

IV. STUDENT LEARNING OUTCOMES:

Upon successful completion of the course students will be able to represent vectors in two- and three-dimensional real space both analytically and geometrically, perform basic vector algebra in these spaces, including computing dot products and cross products, and determine special types of vector-valued functions, including the unit tangent vector and unit normal vector functions; be able to present equations for lines and surfaces given information about the structures; understand the concept of a partial derivative and use it to determine tangent planes and solve optimization problems; be able to evaluate double and triple integrals in rectangular, cylindrical, and spherical coordinates and apply this information to find areas and volumes; and understand line and flux integrals and use the Fundamental Theorem of Line Integrals, Green's Theorem, Stokes' Theorem, and the Divergence Theorem to compute these integrals, as appropriate.

V. TOPICS TO BE COVERED:

Chapter 12:
12.1 Three Dimensional Coordinate Systems
12.2 Vectors
12.3 The Dot Product
12.4 The Cross Product
12.5 Equations of Lines and Planes
12.6 Cylinders and Quadric Surfaces

Chapter 13:
13.1 Vector Functions and Space Curves
13.2 Derivatives and Integrals of Vector Functions
13.3 Arc Length and Curvature
13.4 Motion in Space: Velocity and Acceleration (optional)

Chapter 14:
14.1 Functions of Several Variables
14.2 Limits and Continuity
14.3 Partial Derivatives

14.4 Tangent Planes and Linear Approximations
14.5 The Chain Rule
14.6 Directional Derivatives and the Gradient Vector
14.7 Maximum and Minimum Values
14.8 Lagrange Multipliers

Chapter 15:
15.1 Double Integrals over Rectangles
15.2 Double Integrals over General Regions
15.3 Double Integrals over Polar Coordinates
15.4 Applications of Double Integrals
15.5 Surface Area
15.6 Triple Integrals
15.7 Triple Integrals in Cylindrical Coordinates
15.8 Triple Integrals in Spherical Coordinates
15.9 Change of Variables in Multiple Integrals

Chapter 16:
16.1 Vector Fields
16.2 Line Integrals
16.3 The Fundamental Theorem for Line Integrals
16.4 Green's Theorem
16.5 Curl and Divergence
16.6 Parametric Surfaces and Their Areas
16.7 Surface integrals
16.8 Stokes' Theorem
16.9 The Divergence Theorem

VI. POSSIBLE TEXTS AND REFERENCES:

Calculus Early Transcendentals, 8th edition by James Stewart

VII. STUDENT ACADEMIC MISCONDUCT POLICY:

Maintaining high standards of academic integrity in every class at Tennessee Tech is critical to the reputation of Tennessee Tech, its students, alumni, and the employers of Tennessee Tech graduates. The Student Academic Misconduct Policy describes the definitions of academic misconduct and policies and procedures for addressing Academic Misconduct at Tennessee Tech. For details, view the Tennessee Tech's Policy 217 – Student Academic Misconduct at Policy Central.

VIII. DISABILITY ACCOMMODATION:

Students with a disability requiring accommodations should contact the Office of Disability Services (ODS). An Accommodation Request (AR) should be completed as soon as possible, preferably by the end of the first week of the course. The ODS is located in the Roaden University Center, Room 112; phone 372-6119. For details, view the Tennessee Tech's Policy 340 – Services for Students with Disabilities at Policy Central.