**Math 2415 – Calculus III**

**Calculus: Early Transcendentals, 8th ed.**

Alternate Edition with EWA, James Stewart

Brooks Cole; 8th edition; ISBN-13: 978-1285741550

**Course Description:**

Advanced topics in calculus, including three dimensional coordinate systems, limits and continuity of multivariable functions, partial derivatives, directional derivatives, the gradient, extreme values, multiple integration, the calculus of vector valued functions and line and surface integrals.

**Course Learning Outcomes:**

The student will:

* Perform calculus operations on vector-valued functions, including derivatives, integrals, curvature, displacement, velocity, acceleration, and torsion.
* Perform calculus operations on functions of several variables, including partial derivatives, directional derivatives, and multiple integrals.
* Find extrema and tangent planes. Solve problems using the Fundamental Theorem of Line Integrals, Green's Theorem, the Divergence Theorem, and Stokes' Theorem.
* Apply the computational and conceptual principles of calculus to the solutions of real-world problems.
* Explore selected topics of solid analytic geometry pertaining to lines and planes.
* Use the cylindrical and spherical coordinate systems.
* Use three space vector operations.
* Acquire a graphic and algebraic understanding of quadratic surfaces.
* Analyze and apply the concepts of limits and continuity to multivariable functions.

**Book Sections:**

**Chapter 10**

10.1 Review, Curves Defined by Parametric Equations

10.2 Review, Calculus with Parametric Equations

10.3 Review, Polar Coordinates

10.4 Areas and Lengths in Polar coordinates

**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

**Chapter 14**

14.1 Functions of Several Variables

14.2 Limits and Continuity

14.3 Partial Derivatives

14.4 Tangent Plane and Linear Approximations14.5 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 Rectangles15.2 Iterated Integrals

15.3 Double Integrals over General Regions

15.4 Double Integrals in Polar Coordinates

15.5 Applications of Double Integrals

15.6 Surface Area

15.7 Triple Integrals

15.8 Triple Integrals in Cylindrical Coordinates

15.9 Triple Integrals in Spherical Coordinates

15.10 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

16.10 Summary