

**SYLLABUS**  
**MULTIVARIABLE CALCULUS**  
**MAC 2313**  
(4 credit course)

**Text:** Calculus: Early Transcendentals, 9<sup>th</sup> Edition, by Anton, Bivens, Davis.

**Description:** The course deals with the differential and integral calculus of real multivariable functions.

This syllabus assumes a semester with 28 instructional days. Each class period has 100 minutes. The course covers chapters 11, 12, 13, 14, and 16 from the text-book. They should be covered in the following fashion:

**1- Chapter 11-(4 lectures) Three-Dimensional Space-Vectors**

Rectangular Coordinates in 3-Space; Cylindrical Surfaces. Vectors. Dot Product; Projections. Cross Product. Equations of Lines in 3-Space. Planes in 3-Space. Quadric Surfaces. Cylindrical and Spherical Coordinates

**2- Chapter 12- (3 lectures) Vector-Valued Functions**

Introduction to Vector-Valued Functions; Curves. Calculus of Vector-Valued Functions. Changed of Parameter; Arc Length (Review parametric curves and arc length formula for Parametric Curves). Unit Tangent, Normal and Binormal Vectors. Curvature. Motion Along Curves.

**3- Chapter 13- (6 lectures) Partial Derivatives**

Functions of two or More Variables. Limits and Continuity. Partial Derivatives. Differentiability; and Local Linearity. Chain Rule. Directional Derivative and Gradient. Tangent Planes and Normal Lines. Maxima and Minima of Functions of two Variables. Lagrange Multipliers (optional)

**4- Chapter 14- (6 lectures) Multiple Integration**

Double Integral. Double Integral over Nonrectangular Domains. Double Integral in Polar Coordinates. Parametric Surfaces; Surface Area. Triple Integral. Triple Integral in Cylindrical and Spherical Coordinates. Change of Variable in Multiple Integrals, Jacobians. Center of Gravity using Multiple Integrals.

**5- Chapter 15- (5 lectures) Topics in Vector Calculus**

Vector Fields. Line Integral. Independence of the Path; Conservative Vector Fields. Green's Theorem. Surface Integrals. Applications of Surface Integral. The Divergence Theorem. Stokes' Theorem.

Make sure to cover up to Green's Theorem, if you are running out of time.

This syllabus leaves 4 classes for review and in-class exams. It is recommended that the equivalent of the following exam schedule be given:

Three 100-minute exams in class and a 2 1/2-hour comprehensive final exam during exam week.

A possible breakdown of exam coverage is as follows:

Exam I covers chapters 11

Exam II covers chapter 12-13

Exam III covers chapters 14 and 15