

COURSE OUTLINE FOR MATH 314: CALCULUS WITH ANALYTIC GEOMETRY  
III

TEXT: Calculus with Analytic Geometry, by Larson, Hostetler,  
and Edwards, Houghton Mifflin Company

CHAPTER APPROXIMATE WEEKS

9. Conics, Parametric Equations,  
and Polar Coordinates. 2.5

Do 9.2 Plane Curves and Parametric Equations.

Do 9.3 Parametric Equations and Calculus.

You may omit area of a surface of revolution.

Do 9.4 Polar Coordinates and Polar Graphs.

Maple and graphing calculators are very helpful for polar graphs. A quick review of trigonometric functions is necessary.

Do 9.5 Area and Arc Length in Polar Coordinates.

Omit 9.6 Polar Equations of Conics and Kepler's Laws.

Graphing calculators such as the TI-83 and TI-85, or computer software such as Maple and MathCad will sketch polar graphs.

10. Vectors and the Geometry of Space 2.5

Do 10.1 Vectors in the Plane.

May omit the proofs of the theorems in 10.1.

Do application problems.

Do 10.2 Space Coordinates and Vectors in Space.

Do 10.3 The Dot Product of Two Vectors.

Do 10.4 The Cross Product of Two Vectors in Space.

Omit the details of the proofs, and go light on applications.

Do 10.6 Surfaces in Space. Make sure the students can recognize a surface from its traces. Omit surfaces of revolution.

Do 10.7 Cylindrical and Spherical Coordinates.

Maple will sketch surfaces in rectangular coordinates, as well as in cylindrical and spherical coordinates.

11.	<u>Vector-Valued Functions</u>	1.5
	Do 11.1	Vector-Valued Functions. Go light on the definition of limit and continuity of vector-valued functions.
	Do 11.2	Differentiation and Integration of Vector-Valued Functions.
	Do 11.3	Velocity and Acceleration. (Projectile problems are important applications.)
	Do 11.4	Tangent Vectors and Normal Vectors.
	In 11.5	Arc Length and Curvature. Do arc length; You may omit curvature.
12:	<u>Functions of Several Variables</u>	3.0
	Do 12.1	Introduction to Functions of Several Variables. Light on or omit 12.2 Limits and Continuity.
	Do 12.3	Partial Derivatives
Omit	12.4	Differentials
	Do 12.5	Chain Rule for Functions of Several Variables.
	Do 12.6	Directional Derivatives and Gradients.
	Do 12.7	Tangent Planes and Normal Lines.
	Do 12.8	Extrema of Functions of Two Variables.
	In 12.9	Applications of Extrema of Functions of Two Variables. Do some applied optimization problems. May omit method of least squares.
13.	<u>Multiple Integration</u>	3.5
	Do 13.1	Iterated Integrals and Area in the Plane.
	In 13.2	Double Integrals and Volume. Go light on the definition of double integral.
	Combine	13.3: Change of Variables: Polar Coordinates with 13.8: Change of Variables: Jacobians. Go light on general change of variable; concentrate on polar, cylindrical, and spherical coordinates.
	Do 13.5	Surface Area.
	Do 13.6	Triple Integrals and Applications.
		Review and Testing 1 week
		Total 14 weeks