

Math 2422 - Analytical Geometry & Calculus IIIA

Week	Sec #	Material Covered	Comments
1	11.1 11.2 11.3	Vectors in the Plane. Space Coordinates and Vectors in Space. Dot Products of Two Vectors.	Familiarize yourself with <i>Derive</i> & <i>GyroGraphics</i> in Lab! Tutorials can be picked up in the lab. Ask a TA.
2	11.4 11.5 11.6	Cross Product of Two Vectors in Space. Lines and Planes in Space. Surfaces in Space	<p>Parametric and symmetric forms of lines in space are both used in this text. <i>GyroGraphics</i> is your best tool for plotting curves (and lines) in space.</p> <p><i>GyroGraphics</i> can plot parametric and rectangular coordinates of surfaces. While <i>Derive</i> does an excellent job of doing 3-D plots, <i>GyroGraphics</i> is much more flexible.</p> <p><i>GyroGraphics</i> is not a computer algebra system. <i>Derive</i> has incredible power to do all calculus computations.</p> <p>In some situations it is useful to use the <i>Implicit plot</i> capability of <i>Derive</i>.</p>
3	11.7 12.1 12.2	Cylindrical and Spherical Coordinates. Vector-Valued Functions. Differentiation and Integration of Vector-Valued Functions	Review Polar Coordinates as needed for Cylindrical and Spherical Coordinates. Understanding the relationship between the vector valued function $\mathbf{r}(t)$ and the parametric curve it defines is important.
4	12.3 12.4 12.5	Velocity and Acceleration. Tangent Vectors and Normal Vectors. Arc Length and Curvature.	The unit tangent vector \mathbf{T} is used later in Calc III-B. Curvature may be omitted -- it is useful later in Physics.
5	13.1 13.2	Midterm Examination 11.1 - 12.3 Introduction to Functions of Several Variables. Limits and Continuity.	The concepts of level curves and level surfaces are critical. Use continuity as stepping stone to differentiability.
6	13.3 13.4	Partial Derivatives. Differentials.	
7	13.5 13.6	Chain Rules for Functions of Several Variables. Directional Derivatives and Gradients.	The relationship between gradient vectors and level curves and level surfaces is critical.
8	13.7	Tangent Planes and Normal Lines. Short Review.	
		Uniform Final Examination III-A.	Saturday of 8th week: Time, Date, & Room to be announced.

Math 2423 - Analytical Geometry & Calculus IIIB

Week	Sec #	Material Covered	Comments
9	13.8 13.9 13.10	Extrema of Functions of Two Variables. Applications of Extrema of Functions of Two Variables. Lagrange Multipliers.	<i>GyroGraphics</i> is a whiz with this. We present optimization problems of 3 or more variables, but do not dwell on them.
10	14.1 14.2 14.3	Iterated Integrals and Area in the Plane. Double Integrals and Volume. Change of Variables: Polar Coordinates	It is critical to understanding the order of integration. We use iterated integrals during the remainder of the course. <i>Derive</i> is a powerful tool for computing multiple integrals. We will emphasize applications: you analyze problems situations, set up appropriate integrals, and use <i>Derive</i> as a computational tool. This material is extremely important.
11	14.4 14.5	Center of Mass and Moments and Moments of Inertia. Surface Area.	
12	14.6 14.7	Triple Integrals and Applications. Triple Integrals in Cylindrical and Spherical Coordinates. Midterm Examination 13.8-14.5	
13	15.1 15.2 15.3	Vector Fields. Line Integrals Conservative Vector Fields and Independence of Path.	<i>Derive</i> can plot the vector values of vector-valued (field) functions of two variables. Do 15.3 lightly, stress physical applications.
14	15.4 15.5	Green's Theorem Parametric Surfaces.	Theory and concepts of 15.4 is IMPORTANT. Used together, <i>GyroGraphics</i> and <i>Derive</i> allow us to focus on the mathematics and applications as opposed to spending our time on arithmetic. Two types of surface integrals are presented: mass and flux.
15	15.6 15.7	Surface Integrals. Divergence Theorem.	
16	15.8	Stoke's Theorem.	Realistically, 15.8 may be difficult to cover due to time pressures.
		Uniform Final Examination III-B.	Saturday after end of classes, Time,& Room to be announced.