Mathematics 114: Calculus, Part II. (4h. 1 c.u.)

Functions of several variables, vector-valued functions, partial derivatives and applications, double and triple integrals, conic sections, polar coordinates, vectors and analytic geometry, first and second order ordinary differential equations. Applications to physical sciences. Use of symbolic manipulation and graphics software in Calculus. Note: This course uses Maple

Texts:

Thomas/Finney, Calculus, 9th (or Alternate) Edition
Maple/Calculus Lab Manual for Math 103/104/114/115

Syllabus:

Chapter	Section & Topic	Core Problems
9. Conic Sections, Parameterized Curves, and Polar Coordinates.		
9.4	*Parameterizations of Plan Curves.*	3, 6, 9, 19, 36, 45
9.5	*Calculus with Parameterized Curves.*	2, 5, 9, 17, 18, 24, 33
9.6	*Polar Coordinates.*	6, 22, 23, 29, 31, 37, 60
9.7	*Graphing in Polar Coordinates.*	3, 6, 13, 19, 23, 33, 37, 48
9.9	*Integration in Polar Coordinates.*	3, 15, 21, 25, 30
10. Vectors and Analytic Geometry in Space.		
10.1	*Vectors in the Plane.*	9, 20, 30
10.2	*Cartesian (Rectangular) Coordinates and Vectors in Space.*	11, 53
10.3	*Dot Products.*	8, 25, 45, 57
10.4	*Cross Products.*	3, 6, 31, 37
10.5	*Lines and Planes in Space.*	6, 17, 21, 27, 39
10.7	*Cylindrical and Spherical Coordinates.*	1-10, 17, 27, 32, 39, 40, 43, 51
11. Vector-Valued Functions and Motion in Space.		
11.1	*Vector-Valued Functions and Space Curves.*	3, 7, 11, 14, 17, 23, 29, 35, 37, 39, 44
11.2	*Modeling Projectile Motion.*	3, 5, 9, 14, 26
11.3	*Arc Length and the Unit Tangent Vector* ***T****.*	3, 7, 9, 13, 15
11.4	*Curvature, Torsion, and the TNB Frame.*	3, 5, 15, 23, 27, 30
12. Multivariable Functions and Partial Derivatives.		
12.1	*Functions of Several Variables.*	5, 8, 13, 14, 15, 16, 17, 18, 19, 25, 45
12.2	*Limits and Continuity.*	11, 13, 16, 35
12.3	*Partial Derivatives.*	5, 19, 30, 47, 57, 63, 65
12.4	*Differentiability, Linearization, and Differentials.*	5, 11, 20, 23, 24, 34a
12.5	*The Chain Rule.*	3, 8, 17, 40, 41
12.6	Partial Derivatives with Constrained Variables. (optional)	
12.7	*Directional Derivatives, Gradient Vectors, and Tangent Planes.*	2, 3, 17, 18, 27, 31, 43, 55
12.8	*Extreme Values and Saddle Points.*	6, 11, 17, 29, 36, 39, 42, 53
12.9	*Lagrange Multipliers.*	5, 14, 21, 23, 32, 46
12.10	Taylor's Formula. (optional)	
13. Multiple Integrals.		
13.1	*Double Integrals.*	5, 8, 15, 21, 23, 26, 29, 33, 45, 53, 54, 68
13.2	Areas, Moments, and Centers of Mass. (optional)	
13.3	*Double Integrals in Polar Form.*	6, 12, 13, 19, 35, 37, 44
13.4	*Triple Integrals in Rectangular Coordinates.*	1, 3, 7, 13, 19, 23, 29, 39, 41, 47
13.5	Masses and Moments in Three Dimensions. (optional)	
13.6	*Triple Integrals in Cylindrical and Spherical Coordinates.*	39, 40
13.7	Substitutions in Multiple Integrals. (optional)	
Appendices.		
A-3	*Complex Numbers.*	1-14, 23, 24, 27, 30

Chapter	**Section & Topic**	**Core Problems**
16. Preview of Differential Equations.		
16.1	Separable First Order Equations. (review, optional)	
16.2	*Exact Differential Equations.*	5, 13, 20
16.3	*Linear First Order Equations.* (review)	1, 3, 10, 11, 19
16.4	*Linear Homogeneous Second Order Equations.*	1, 6, 11, 13, 18
16.5	*Second Order Equations; Reduction of Order.*	1, 7, 9, 14, 20, 43, 58
16.6	*Oscillation.*	1, 3c, 4, 5
16.7	*Power Series Solutions.*	2, 5, 9, 13, 14
16.8	*Slope Fields and Picard's Theorem.*	3, 7, 9, 11, 17
16.9	Numerical Methods. (optional)	

SAMPLE EXAM QUESTIONS (see the Math 114 web page) also form a part of the core problem set.