MA 242 Schedule, Spring Semester

Week	Section	Topic
1	1.1	Cartesian coordinates in 2- and 3-dimensional space
	1.2	Vectors in 2- and 3-dimensions
	1.3	The angle between two vectors and the dot product
	1.4	The cross and triple products
2	1.5	Lines and planes in space
	2.1	The calculus of vector-valued functions: limits, derivatives, and integrals
	2.2	Parameterized curves in space, Newton's second law, free fall and projectile motion under gravity
3	2.3	Fundamental quantities associated with a curve: tangent vectors, arc length, and curvature
		Review for Test 1
Monday		TEST 1
4	2.4	Intrinsic geometry of curves in 3-dimensional space: curvature, osculating plane, and osculating circle
	2.5	The decomposition of the acceleration vector into its normal and tangential components and the formula $$\vec{a}(t)=\frac{d\vec{v}}{dt}(t)\hat{T}(t)+\kappa(t)v^2(t)\hat{N}(t)$$
5	3.1	Multivariable functions, level curves and level surfaces of functions, parametric surfaces
	3.2	Limits and continuity
	3.3	Partial derivatives, higher order derivatives
6	3.3	Geometric interpretation of partial derivatives, tangent plane to the graph of $f(x,y)$
	3.4	Differentiability of multivariable functions: definition, differentiability and continuity; theorem 9 on differentiability
	3.5	The directional derivative and the gradient, formula for the directional derivative in terms of the gradient (corollary 2)
7	3.5	The chain rule for multivariable functions; implicit differentiation Tangent plane to a graph $z = f(x,y)$, tangent plane to a level surface
	3.6	Optimization: local and global extreme values of $f(x,y)$; Lagrange multipliers
		Review for Test 2
Monday		TEST 2
8	4.1	Double integral over a rectangle as a limit of Riemann sums; Fubini's theorem for double integrals over rectangles; iterated integrals; double integrals over general regions; reversing the order of integration
	4.2	Applications of double integrals
9	4.3	Triple integrals in Cartesian coordinates over rectangular solid regions; triple integrals over *x*-, *y*-, and *z*-simple regions; applications of triple integrals
	5.1	Double integrals in polar coordinates over polar rectangles
11	5.1	Double integrals in polar coordinates over more general regions
	5.2	Triple integrals in cylindrical coordinates
	5.3	Triple integrals in spherical coordinates
		Review for Test 3
Monday		TEST 3
12	6.1	Vector Fields
	6.2	Line integrals of functions (first, briefly review parameterized curves from section 2.2 and formula 2.6 for ds/dt in section 2.3)
13	6.3	Line integrals of vector fields; the fundamental theorem for line integrals
	6.3	Conservative vector fields and potential functions, conservation of total energy
	6.4	Parametric surfaces in space, graphs, spheres, and cylinders
14	6.5	Area of a parametrized surface; tangent plane to a parametric surface; surface integral of a function; surface integral of a vector field
		Review for Test 4
Monday		TEST 4
15	7.2	Curl and divergence of a vector field; Maxwell's equations and electromagnetic waves (optional)
	7.3	Green's theorems for circulation
16	7.4	Stokes' theorem
	7.5	The divergence theorem
		Semester summary