Department of Mathematics
North Carolina State University
MA 242 Schedule – Fall 2018

Course Description: Third of three semesters in a calculus sequence for engineering and science majors. The course covers differential and integral multivariable calculus. The course is scheduled for **5 days per week**. The day-by-day schedule listed below is based on 4 topics per week spread over the 5 days. Another option is 4 lectures and one day for working problems per week.

Tests: There are 4 scheduled tests during the semester. The test dates **(Sept. 17, Oct. 12, Nov. 5, Nov. 30)** have been coordinated with Physics and hence the test dates **cannot be changed**.

WebAssign: WebAssign is a required component of MA242. All MA242 students must register online with WebAssign at webassign.ncsu.edu) and pay the fee for homework grading and the textbook. It is recommended that WebAssign homework count for 10-15% of your students' grades.

Textbook: *Calculus for Engineers and Scientists, Volume III,* by John E. Franke, John R. Griggs, and Larry K. Norris, 1st edition. The text is in pdf format and will be available to the students via WebAssign.

Students with disabilities: Reasonable accommodations will be made for students with verifiable disabilities. In order to take advantage of available accommodations, students must register with Disability Services for Students at http://www.ncsu.edu/dso/

MA 242 Day-by-day Schedule, Fall 2018

Week of	Section	Topic
8/22 – 8/24	1.1	Cartesian coordinates in 2- and 3-dimensional space
	1.2	Vectors in 2- and 3-dimensions
	1.2	Continue study of vectors
8/27 – 8/31	1.3	The angle between two vectors and the dot product
	1.4	The cross product
	1.5	Lines and planes in 3-dimensional space
		More on equations of lines and planes
9/03	Monday	Holiday
9/04 – 9/07	2.1	The calculus of vector-valued functions: limits, derivatives, and integrals
	2.2	Parameterized curves in space, Newton's second law, free fall under gravity
	2.2	Projectile motion under gravity
9/10 – 9/14	2.3	Fundamental quantities associated with a curve: tangent vectors, arc length, and curvature
	2.4	The intrinsic geometry of curves in 3-dimensional space: curvature and the osculating plane
	2.4	More on the geometry of curves in space: the osculating circle
	2.5	The decomposition of the acceleration vector into its normal and tangential components and the formula $\boxed{\vec{a}(t) = \frac{dv}{dt}(t)\widehat{T}(t) + \kappa(t)v^2(t)\widehat{N}(t)}$
		Review for Test #1
September 17	Monday	TEST #1
9/18 – 9/21	3.1	Multivariable functions (material up through level curves)
		Level surfaces of functions of 3 variables, parametric surfaces
	3.2	Limits and continuity: theorems on limits and continuity
	3.3	Directional derivatives, partial derivatives, higher order derivatives
9/24 – 9/28	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 characterizing differentiability
	3.5	The directional derivative and the gradient: formula for the directional derivative in terms of the gradient (Corollary 2)
		What does the gradient vector say about a function?
10/01 – 10/03	3.5	The chain rules for multivariable functions. Implicit differentiation
		Tangent planes to graphs $z = f(x,y)$, tangent planes to level surfaces
	3.6	Optimization: local and global extreme values of $f(x,y)$

10/04 – 10/05		Fall Break
10/8 – 10/11	3.6/3.7	More on extreme values; Lagrange multipliers (optional)
	4.1	Double integral over a rectangle as a limit of Riemann sums
		Fubini's theorem for double integrals over rectangles; iterated integrals
		Review for test #2
October 12	Friday	TEST #2
10/15 – 10/19	4.1	Double integrals over general regions
		Reversing the order of integration
	4.2	Applications of double integrals
		More on applications of double integrals
	4.3	Triple integrals in Cartesian coordinates over rectangular solid regions
10/22 – 10/26	4.3	Triple integrals over *z*-simple regions
		Triple integrals over *x*- and *y*- simple regions
		Applications of triple integrals
	5.1	Double integrals in polar coordinates over polar rectangles
10/29 – 11/02	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
November 5	Monday	TEST #3
11/06 – 11/09	5.3	More on triple integrals in spherical coordinates
	6.1	Vector Fields
	6.2	Line integrals (first, briefly review parameterized curves from section 2.2 and formula #2.6 for *ds/dt* in section 2.3)
11/12 – 11/16	6.2	Line integrals of functions
	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
11/19 – 11/20	6.5	Surface integrals: surface area of a parametrized surface. Tangent planes to parametric surfaces
	6.5	Surface integral of a function
11/21 – 11/23		Thanksgiving Holiday
11/26 – 11/29	6.5	Surface integral of a vector field
	7.1	Integral curves of vector fields
	7.2	The curl and divergence of a vector field. Maxwell's equations and electromagnetic waves (optional)
		Review for test #4

11/30	Friday	TEST #4
12/03 – 12/06	7.3	Green’s theorems for circulation and for flux
	7.4	Stokes’ theorem
	7.5	The divergence theorem
12/07 (last class)	7.7	Generalized Stokes’ theorem; semester summary