Department of Mathematics
North Carolina State University
MA 242 Schedule
Spring 2019

Course Description: Third of three semesters in a calculus sequence for engineering and science majors. The course covers differential and integral multivariable calculus.

Tests: There are 4 scheduled tests during the semester. The test dates **(Jan. 28, Feb. 25, Mar. 29, Apr. 22)** have been coordinated with Physics. If the test dates need to be adjusted, avoid the dates of major physics exams (2/05, 2/19, 2/26, 4/02 and 4/09).

WebAssign: WebAssign is a required component of MA242. All MA242 students must register online with WebAssign (Webassign.ncsu.edu) and pay the fee for homework grading and the textbook. It is recommended that WebAssign homework count for around 10–15% of the class grade.

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; http://www.ncsu.edu/dso/

MA 242 Day-by-day Schedule, Spring 2019

Week of	Section	Topic
1/07–1/11	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
	1.3/1.4	More on the dot product. The cross product
1/14–1/18	1.4	More on the cross product
	1.5	Lines and planes in 3-dimensional space
		More on equations of lines and planes
	2.1	The calculus of vector-valued functions: limits, derivatives, and integrals
1/21	Monday	Holiday
1/22–1/25	2.2	Parameterized curves in space, Newton's second law, free fall under gravity, projectile motion under gravity
	2.3	Fundamental quantities associated with a curve: tangent vectors, arc length, and curvature
		Review for Test #1
January 28	Monday	TEST #1
1/29–2/01	2.4	The intrinsic geometry of curves in 3-dimensional space: curvature and the osculating plane/circle
	2.5	The decomposition of the acceleration vector into its normal and tangential components and the formula $\vec{a}(t) = \frac{d\vec{v}}{dt}(t)\hat{T}(t) + \kappa(t)v^2(t)\hat{N}(t)$
	3.1	Multivariable functions, level curves and level surfaces, parametric surfaces
2/04–2/08	3.2	Limits and continuity: theorems on limits and continuity
	3.3	Partial derivatives, higher order derivatives, geometric interpretation of partial derivatives, tangent plane to the graph of $f(x,y)$
	3.3/3.4	Tangent plane to the graph of $f(x,y)$, differentiability of multivariable functions: definition, differentiability and continuity; Theorem 9 on characterizing differentiability
2/11–2/15	3.5	The directional derivative and the gradient: the formula for the directional derivative in terms of the gradient (Corollary 2)
		The chain rules for multivariable functions. Implicit differentiation
		Tangent planes to graphs $z = f(x,y)$, tangent planes to level surfaces
2/18–2/22	3.6	Optimization: local and global extreme values of $f(x,y)$
	3.6/3.7	More on extreme values; Lagrange multipliers (optional)
		Review for test #2
February 25	Monday	TEST #2

Week of	Section	Topic
2/26–3/01	4.1	Double integrals over a rectangle as a limit of Riemann sums
		Fubini's theorem for double integrals over rectangles; iterated integrals
		Double integrals over general regions
3/04–3/08	4.1	Reversing the order of integration
	4.2	Applications of double integrals
	4.3	Triple integrals in Cartesian coordinates over rectangular solid regions
		Triple integrals over *x*-, *y*-, and *z*-simple regions
3/11–3/15		Spring Break
3/18–3/22	4.3	Applications of triple integrals
	5.1	Double integrals in polar coordinates over polar rectangles
		Double integrals in polar coordinates over more general regions
	5.2	Triple integrals in cylindrical coordinates
3/25–3/28	5.3	Triple integrals in spherical coordinates
	6.1	Vector Fields
		Review for test #3
March 29	Friday	TEST #3
4/01–4/05	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)
	6.3	Line integrals of vector fields: the fundamental theorem for line integrals
		Conservative vector fields and potential functions
4/08–4/12	6.4	Parametric surfaces in space; graphs, spheres, and cylinders
	6.5	Surface integrals: surface area of a parametrized surface, surface integral of a function
		Surface integral of a vector field
4/15–4/18	7.3	Green's theorems for circulation
		Review for test #4
4/19		Holiday
April 22	Monday	TEST #4
4/22 –4/26	7.2	The curl and divergence of a vector field
	7.4	Stokes' theorem
	7.5	The divergence theorem
		Semester summary