Department of Mathematics
North Carolina State University
MA 242 Schedule – Fall 2017

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. 11, Oct. 2, Oct. 30, Nov. 20)** 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 (Webassign.ncsu.edu) and pay the fee for homework grading and the textbook. It is recommended that WebAssign homework count for 5-10% 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.

All materials related to the Maple program can be found at the URL **http://www.math.ncsu.edu/calculus**

Maple Homework Assignments: There are 8 scheduled Maple Homework assignments distributed throughout the semester. The "Start" and "Due dates" are listed below in the day-by-day schedule. The "start" dates have been adjusted so that the Maple Homework materials correspond to the lecture materials. It is the responsibility of each student to (1) download the Maple Lessons from the web, (2) study the Lessons, and (3) complete the Maple Homework assignments on time. Faculty members should read the information about (1) obtaining Maple grades and (2) granting extensions on Maple homework at the URL given above.

Students with no previous Maple experience: Students with no Maple experience need to follow the instructions in the "***Introductory Materials***". These instructions are posted on the calculus with Maple homepage listed above.

Extensions on Maple Homework: Short extensions on Maple Homework assignments can only be given for extreme situations. If a student has a valid reason to request an extension, then the student must request the extension from the student's lecture instructor

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 Fall, 2017

Week of	Section	Topic
8/16 – 8/18	1.1	Cartesian Coordinates: In 2 and 3 dimensional space
	1.2	Vectors in 2 and 3 Dimensions:
	1.2	Continue study of vectors
Friday		Maple HW 0 and 1 begin. Due Aug. 25
8/21 – 8/25	1.3	The Angle Between Two Vectors: The Dot Product
	1.4	The Cross Product:
	Wed. 8/23	Maple HW 2 begins: "Lines and Planes"; Due Aug. 31.
	1.5	Lines and Planes in 3-dimensional Space
		More on equations of lines and planes
8/28 – 9/1	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.
	2.3	Fundamental Quantities Associated with a Curve: Tangent vectors, arc length and curvature
9/4	Monday	Holiday
	2.4	The Intrinsic Geometry of Curves in 3-Space; curvature and the **osculating plane**
9/5 – 9/8	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 $\vec{a}(t) = \frac{dv}{dt}(t)\hat{T}(t) + \kappa(t)v^2(t)\hat{N}(t)$
		Review for Test #1
September 11	Monday	TEST #1
9/12 – 9/15		Multivariable Functions: Material up through level curves
	3.1	Level surfaces of functions of 3 variables. Parametric surfaces.
	3.2	Limits and Continuity: Theorems on limits; Continuity;
	3.3	Directional Derivatives: Partial derivatives; higher derivatives;
9/18 – 9/22	3.3	Geometrical 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?
Friday		Maple HW 3 begins: "Applications of the gradient"; Due 9/29

9/25 – 9/29		The Chain rules for multivariable functions
	3.5	Tangent planes to graphs z = f(x,y); The general chain rule
	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
Monday, 10/2	Monday	TEST #2
10/3 - 10/6	4.1	Double Integrals over a rectangle as a limit of Riemann sums
		Fubini's Theorem for double integrals over rectangles; iterated integrals
	Tuesday 10/4	Maple HW #4 begins: "Boundaries of regions in the plane" Due 10/13
10/5 – 10/6		Fall Break
10/9 – 10/13	4.1	Double integrals over general regions
		Reversing the order of integration;
	4.2	Applications of Double Integrals
		More on applications of double integrals
	Friday 10/13	Maple HW #5 begins: "Boundaries of regions in space"; Due 10/20
10/16 – 10/20	4.3	Triple Integrals in Cartesian Coordinates: Over rectangular solid regions
		Triple integrals over z-simple regions
		Triple integrals over x- and y- simple regions
		Applications of triple integrals
10/23 – 10/27	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
		Review for test #3
10/30	Monday	TEST #3
10/31 – 11/3	5.3	Triple integrals in spherical coordinates
	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.
11/6 – 11/10	6.2	Line integrals of functions
	6.3	Line integrals of vector fields: The fundamental theorem for line integrals
	5.3	Conservative vector fields and potential functions; Conservation of total energy
	Thursday 11/9	Maple HW #6 begins: "Parametric Surfaces"; Due 11/17
	6.4	Parametric Surfaces in Space: graphs, spheres and cylinders
11/13 – 11/17	6.5	Surface Integrals: Surface Area of a Parametrized Surface Tangent planes to parametric surfaces
	Wed. 11/15	Maple HW #7 begins: "Surface Integrals"; Due 11/20

	6.5	Surface Integral of a Function
		Surface Integral of a Vector Field
		Review for test #4
11/20	Monday	TEST #4
11/21	7.1 7.2	Integral Curves of Vector Fields The Divergence of a Vector Field
11/22 – 11/24		Thanksgiving Holiday
11/27 – 12/1	7.2	The Curl of a Vector Field: Maxwell's Equations and Electromagnetic Waves (Optional)
	7.3	Green's Theorems: for circulation and for flux
	7.4, 7.5	Stokes' Theorem, The Divergence Theorem
Last day of classes	7.6	Generalized Stokes' Theorem; Semester Summary