SM223 Calculus III with Optimization
Fall 2004–2005 Syllabus

Text: *Calculus, Concepts and Contexts, 2nd Edition* by James Stewart

NOTES:

1. We will be continuing from Calculus II with the same textbook and calculator. The Mathematics Department course website **http://www.usna.edu/MathDept/website/courses/fall2004.html** will have the most up to date information about SM223, including ***Syllabus***, ***Vector Notes***, ***Java Applets***, ***Maple Notes***, practice exams, etc.
2. Some of the problems assigned require some assistance from a calculator or computer. You should learn to make creative use of both these software tools to help you analyze problems. Homework problems where Maple is helpful are indicated with an "**M**".
3. The value you get out of this course is proportional to the effort you put into it. Keep in mind that the primary goal (and your responsibility) is not just doing the problems, but rather understanding the material. Exercises that ask for verbal explanations should be answered with complete sentences.
4. If you would like help in the course, you should contact your instructor for extra instruction. If your instructor is not available, try the Math Lab. It is staffed all six class periods every class day with instructors who should be able to answer your questions. Also, hard copies of web page information will be kept there (syllabi, practice tests, etc.). Peer tutoring may also be available in the evenings.
5. The final exam will be common and comprehensive and will require the use of your calculator. It is possible that some questions will rely on a basic knowledge of MAPLE. A list of Maple commands useful in SM223 is at the end of this webpage.

Day	Section	Topics	Problems
1	*9.1*	*Three-Dimensional Coordinate System*	p651: 5,6,14,16,17c,19,24,26,27
2	*9.2*	*Vectors (see **Vector Notes**)*	p659: 4,6ef,7,11,13,17,23,24
3	*9.3*	*Dot Product*	p666: 1,2,3,5,6,7,9,15,17
4	*9.3*	*Dot Product, Cross Product (see **Java Applet**)*	p666: 21,23,29,31,35 p674: 1,2,3
5	*9.4*	*Cross Product (omit triple products)*	p674: 7,9,11,13,15,17
6	*9.5*	*Equations of Lines and Planes*	p683: 1,3,5,7,15,17
7	*9.5*	*Equations of Lines and Planes*	p683: 19,23,25,29,33
8	*9.5*	*Maple Review (see **Maple Notes**)*	P683: 4,12,42,45
9	*10.1*	*Vector Functions and Space Curves*	p710: 1,5–11
10	*10.1*	*Vector Functions and Space Curves*	p710: 13,15,**21M**,**23M**,27
11	*10.2*	*Derivatives and Integrals of Vector Functions*	p716: 1,3,5,6,11,**23M**,28,35,36
12	*10.3*	*Arc Length (through p718)*	p723: 1,3,**6M**
13	*10.4*	*Motion in Space (through p728)*	p733: 1,2,3,7,9,13
14	*10.4*	*Motion in Space (through p728)*	p733: 15a,16a,21,23,25
15	*9.6*	*Functions and Surfaces*	p692: 1,3,9,10,11,12,13
16	*9.6*	*Functions and Surfaces*	p692: 15,19,20,**28M**,**29M**
17		Review	
18		TEST #1	
19	*11.1*	*Functions of Several Variables*	p756: 2,3,8,9,10,15,23,25
20	*11.1*	*Functions of Several Variables*	p756: **29M**,**30M**,31–36,37,38
21	*11.3*	*Partial Derivatives*	p776: 1,3,5,6,8
22	*11.3*	*Partial Derivatives*	p776: 13,15,17,21,27,35, **Hill Web Lab**
23	*11.3*	*Partial Derivatives (see **Maple Frost Animation**)*	p776: 47,53,54,60,68,69
24	*11.4*	*Tangent Planes and Linear Approximations (omit differentials and parametric surfaces)*	p788: 1,3,**5M**,9&11(linearization only)

25	*11.4*	*Tangent Planes and Approximations*	p788: 13,16,17
26	*11.5*	*Chain Rule*	p796: 1,5,7,9,10,17,30
27	*11.5*	*Chain Rule*	p796: 27,29,32,33,34
28		Review	
29		TEST #2	
30	*11.6*	*Directional Derivatives and Gradient Vector*	p808: 1,3,7,9,11,13,18
31	*11.6*	*Directional Derivatives and Gradient Vector*	p808: 19,21,25,26,28,34,35,37
32	*11.7*	*Maximum and Minimum Values*	p818: 1,3,5,7,**15M**
33	*11.7*	*Maximum and Minimum Values*	p818: **16M**,25,43
34	*11.7*	*Maximum and Minimum Values*	p818: 31,33,35,37
35	*11.7*	*Maximum and Minimum Values*	p818: 39,40,42,44
36	*11.8*	*Lagrange Multipliers*	p827: 1,3,5,7,23
37	*11.8*	*Lagrange Multipliers*	p827: 19,21,27,31,33
38	*11.8*	*Lagrange Multipliers (two constraints)*	p827: 15,17,36,37
39		Review	
40		TEST #3	
41	*12.1*	*Double Integrals over Rectangles*	p847: 1b,5,9,11,13
42	*12.2*	*Iterated Integrals*	p853: 3,7,9,11
43	*12.2*	*Iterated Integrals*	p853: 13,17,19,23
44	*12.3*	*Double Integrals over General Regions*	p861: 1,11,13,15,17
45	*12.3*	*Double Integrals over General Regions*	p861: 21,23,29,31,35,37
46	*12.4*	*Double Integrals in Polar Coordinates*	p867: 1–7,11
47	*12.4*	*Double Integrals in Polar Coordinates*	p867: 15,20,23,25,26
48	*12.7*	*Triple Integrals*	p890: 3,7,9,13,15
49	*12.7*	*Triple Integrals*	p890: 18,**19M**,23,29,36 (mass only)
50	*9.7*	*Cylindrical and Spherical Coordinates*	p698: 3,5,7,9,11–15,21,25,28
51	*12.8*	*Triple Integrals in Cylindrical & Spherical*	p898: 1,2,5,7,8
52	*12.8*	*Triple Integrals in Cylindrical & Spherical*	p898: 3,4,6,15,18,19
53	*12.8*	*Triple Integrals in Cylindrical & Spherical*	p898: 13 (mass only),22a,29,30
54		Review	
55		TEST #4	
56–59		Semester Review	

Maple Command	Action
`> plot3d(x^2 + y^2, x = -1..1, y = -2..2);`	**plots a surface in three dimensions**
`> contourplot(x^2 + 3*y^2, x = -1..1, y = -1..1);`	**plots a contour diagram**
`> implicitplot3d(x^2+y^2+z^2=9, x=-4..4, y=-4..4, z=-4..4);`	**plots a surface in three dimensions**
`> spacecurve( [cos(t), sin(t), t], t = 0..4*Pi);`	**plots a curve in three dimensions**
`> diff(x^2*y + x*y, x);`	**computes a partial derivative**
`> int(int(x^2 + x*y, x = 0..1), y = 3..4);`	**computes a double integral**
`> solve( {x + 2*y = 2008, 3*x + y = 1845}, {x,y});`	**solves a system of equations**