

## **Math. 114. Calculus, Part II. (4h. 1 c.u.)**

*{NOTE: Syllabus effective Spring Semester 2006}*

**Gen Req IV:** May be counted towards the General Requirement in Formal Reasoning & Analysis.

Functions of several variables, vector-valued functions, partial derivatives and applications, double and triple integrals, conic sections, polar coordinates, vectors and analytic geometry, first and second order ordinary differential equations. Applications to physical sciences. Use of symbolic manipulation and graphics software in Calculus. Note: This course uses Maple®

Texts: Stewart, *Calculus, 5th Edition*

Maple/Calculus Lab Manual for Math 103/104/114

### **13 Vectors and the Geometry of Space**

13.1 Three-Dimensional Coordinate Systems	829	6, 18, 21, 23, 25, 29, 41
13.2 Vectors	834	1, 4, 8, 18, 24, 28, 32
13.3 The Dot Product	843	1, 2, 4, 8, 11, 14, 17, 37, 41, 53
13.4 The Cross Product	850	2, 9, 12, 26, 33, 36, 39, 45
13.5 Equations of Lines and Planes	858	1, 3, 15, 16, 17, 30, 38, 51, 61, 73
13.6 Cylinders and Quadric Surfaces	868	2, 5, 9, 11, 21–28
13.7 Cylindrical and Spherical Coordinates	875	4, 10, 13, 20, 23, 28, 34, 36, 50

### **14 Vector Functions**

14.1 Vector Functions and Space Curves	885	4, 6, 9, 11, 16, 19–24, 34, 37, 39
14.2 Derivatives and Integrals of Vector Functions	892	3, 10, 17, 21, 22, 29, 31, 47
14.3 Arc Length and Curvature	898	2, 7, 10, 14, 17, 26, 40, 43, 47, 49, 50
14.4 Motion in Space: Velocity and Acceleration	906	1, 2, 5, 21, 22, 28, 33

### **15 Partial Derivatives**

15.1 Functions of Several Variables	923	1, 2, 6, 11, 30, 32
15.2 Limits and Continuity	938	3, 7, 10, 11, 37, 39
15.3 Partial Derivatives	945	1, 4, 5, 16, 21, 51, 66, 83
15.4 Tangent Planes and Linear Approximations	959	2, 12, 20, 24, 31
15.5 The Chain Rule	967	4, 8, 16, 36
15.6 Directional Derivatives and Gradient Vector	976	3, 9, 15, 23, 27, 36, 38

15.7 Maximum and Minimum Values	989	1, 3, 5, 11, 23, 37
15.8 Lagrange Multipliers	1001	1, 2, 4, 10, 23, 25, 39

### **16 Multiple Integrals**

16.1 Double Integrals over Rectangles	1017	3, 6, 8, 12, 17
16.2 Iterated Integrals	1025	4, 5, 14
16.3 Double Integrals over General Regions	1031	3, 10, 24, 39, 43
16.4 Double Integrals in Polar Coordinates	1039	1, 3, 7, 10, 18, 21, 33, 36
16.5 Applications of Double Integrals	1045	4, 14, 23, 26
16.6 Surface Area	1055	4, 14
16.7 Triple Integrals	1059	3, 8, 16, 22, 26
16.8 Triple Integrals in Cylindrical and Spherical Coordinates	1069	3, 8, 18
16.9 Change of Variables in Multiple Integrals	1077	2, 12, 13, 14

### **10 Differential Equations**

10.1 Modeling with Differential Equations	623	1, 5, 8, 9, 11, 14
10.2 Direction Fields and Euler's Method	628	1, 3, 4, 5, 6, 12
10.3 Separable Equations	637	4, 6, 13, 22, 32, 42
10.4 Exponential Growth and Decay	647	4, 5, 16, 22
10.5 The Logistic Equation	659	1, 4, 5, 7, 13
10.6 Linear Equations	668	9, 8, 15, 29
10.7 Predator-Prey Systems	674	2, 3, 4

### **18 Second-Order Differential Equations**

18.1 Second-Order Linear Equations	1177	1, 2, 5, 14, 15, 17, 26
18.2 Nonhomogeneous Linear Equations	1183	1, 2, 3, 12, 20, 26
18.3 Applications of Second-Order Differential Equations	1191	2, 3, 5, 6
18.4 Series Solutions	1199	1, 3, 12

### **Appendix**

G Complex Numbers	A48	1, 5, 10, 16, 22, 27, 31, 38, 45
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**NOTES:** All sections of Math 114 will have a common final examination. Common midterm examinations *may* be given outside regular class times at the professors' option.

Sample Final Exam Problems (which may be found at the end of this Lab Manual and on the Mathematics Department's web site) also form part of the core problem set