Syllabus for MATH 241, Summer II, 2008

Chapter 12: Introduction to 3-D geometry and vectors
12.1 Cartesian coordinates in 3 dimensions
12.2-4 Vectors and algebraic/geometric operations with them:
   12.2 addition, subtraction, scalar multiplication
   12.3 \( v \cdot w \) (a scalar), and its applications
   12.4 \( v \times w \) (a vector), and its applications
12.5-6 lines and planes in 3-space
12.8 cylindrical and spherical coordinates [12.7 is omitted]

Chapter 13: curves and motion in the plane and 3-space
13.1 graphics
13.2 derivatives and antiderivatives
13.3, 13.6 velocity, acceleration and equations for position
13.4 arc length [and parametrizations if time permits]
13.5 tangent and normal vectors
13.5 curvature

Chapter 14: Functions of several variables: real-valued functions whose domain is
a subset of the plane or of 3-space
14.1 graphics
14.2 limits and continuity
14.3, 14.6-7 differentiation in several variables
   14.3 partial derivatives
   14.6 directional derivatives and gradients
   14.7 equations of tangent planes
14.4 approximation using differentials
14.5 chain rule in several variables
14.8 [and 14.9 if time permits] maxima and minima of functions of two variables

Chapter 15: Multiple integrals
15.1 Double integrals over simple regions
15.2 Double integrals over more complicated regions
15.3 Double integrals in polar coordinates
15.5 Triple integrals [15.4 is omitted]
15.7 Triple integrals in cylindrical and spherical coordinates
   [15.6 and 15.8 are omitted]

OVER
Chapter 16: Topics in vector analysis

16.1 vector fields; their divergence and curl; gradient fields and their potential functions
16.2 line integrals of two kinds
16.3 more about gradient fields including independence of path
16.4 Green’s theorem and applications

There is much more about vector analysis in your textbook, but that is a topic covered in MATH 550, using books that treat the subject in more depth than a standard calculus textbook does.

Notes and assignments

Practice problems on Section 12.1:
Quick Check Exercises 1 and 2
Exercises 1, 7, 11, 17, 19

The first quiz in this course is Wednesday, July 8, on Section 12.1. Quizzes will be daily unless otherwise indicated, with the topic announced at least a day in advance.

Practice problems on Section 12.2:
All Quick Check Exercises
Exercises 7a c, 9, 11a b f, 15 a d f 19, and 21 b c

Practice problems on Section 12.3:
Quick Check 1 through 4
1 c d, 3 c d

Practice problems on Section 12.4:
Quick Check 1, 2, 4
3, 7a b, 13, 21

Practice problems on Section 12.5:
Quick Check 1, 2, 3
1, 7, 15

Practice problems on Section 12.6:
Quick Check 1 through 4
3, 13, 15