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 $\mathbf{v} \cdot \mathbf{w}$ (a scalar), and its applications

12.4 $\mathbf{v} \times \mathbf{w}$ (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

13.6 velocity, acceleration and equations for position

13.3 arc length [and parametrizations if time permits]

13.4 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]

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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