

MATH 223. Calculus for Science and Engineering III (3)

SYLLABUS FALL 2008

Course Description: Introduction to vector algebra; lines and planes. Functions of several variables: partial derivatives, gradients, chain rule, directional derivative, maxima/minima. Multiple integrals, cylindrical and spherical coordinates. Derivatives of vector valued functions, velocity and acceleration. Vector fields, line integrals, Green's theorem. Prereq: MATH 122.

Instructor: Peter Thomas (pjthomas -- at -- case.edu)

Office Hours: Monday & Wednesday 2:00-3:30 p.m. or by appointment.

Course Meetings: Monday, Wednesday & Friday 10:30-11:20 a.m.

Text: Edwards & Penney Calculus / Early Transcendentals 7th Ed.

Exams: Midterm Exams will be held in class on 9/24, 10/24, 11/21.

The final will be on Tuesday, Dec 9 from 4:00 - 7:00 p.m.

Requirements

Twice weekly reading assignments, practice exercises, and classroom demonstrations. Attendance daily class sessions is required. There will be three 45-minute midterm exams and one three-hour cumulative final exam. Conflicting travel arrangements will not be grounds for making up exams. **Please notify the instructor NOW if you anticipate any problem with the exam dates.**

The grade will be based on the following:

5% practice exercises, class attendance, participation, homework, demonstrations, *et cetera*

15% midterm I (Chapter 11)

15% midterm II (Chapters 11 & 12 -- emphasis on new material)

15% midterm III (Chapters 11, 12 & 13 -- emphasis on new material)

50% final exam (Chapters 11, 12, 13 & 14 -- new material & cumulative)

Syllabus

(15 weeks, 42 class meetings)

Chapter 11. Vectors, Curves and Surfaces in Space

week 1. (8/25, 8/27, 8/29)

11.1-2-3 Planar Vectors & Vectors in 3D & Cross Product

week 2. (9/3, 9/5)

11.4 Lines and Planes in 3D

11.5 Curves and Motions in Space

week 3. (9/8, 9/10, 9/12)

11.6 Curvature and Acceleration

11.7 Cylinders and Quadric Surfaces

week 4 (9/15)

11.8 Cylindrical and Spherical Coordinates

Chapter 12. Partial Differentiation

week 4 (9/17, 9/19)

12.1-2 Introduction, Functions of Several Variables

week 5. (9/22, 9/24, 9/26)

12.3 Limits and Continuity

EXAM (Chapter 11) Wednesday 9/24

12.4 Partial Derivatives

week 6. (9/29,10/1,10/3)

12.5 Multivariable Optimization Problems

12.6 Increments and Linear Approximation

week 7. (10/6, 10/8, 10/10)

12.7 The Multivariable Chain Rule

12.8 Directional Derivatives and the Gradient Vector

week 8. (10/13, 10/15, 10/17)

12.9 Lagrange Multipliers and Constrained Optimization

12.10 Critical Points of Functions of Two Variables

10/20 = = = FALL BREAK

Chapter 13. Multiple Integrals

week 9. (10/22, 10/24)

13.1 Double Integrals

EXAM (Chapter 12 sections 1-9) Friday 10/24

week 10. (10/27, 10/29, 10/31)

13.2 Double Integrals over More General Regions

13.3 Area and Volume by Double Integration

13.4 Double Integrals in Polar Coordinates. Wear your hallowe'en costume.

week 11. (11/3, 11/5, 11/7)

13.5 Applications of Double Integrals

13.6 Triple Integrals

13.7 Integration in Cylindrical and Spherical Coordinates

week 12. (11/10, 11/12, 11/14)

13.8 Surface Area

13.9 Change of Variables in Multiple Integrals

Chapter 14. Vector Calculus

week 13. (11/17, 11/19, 11/21)

14.1 Vector Fields

14.2 Line Integrals

EXAM (Chapter 13) Friday 11/21

week 14. (10/24, 10/26)

14.3 The Fundamental Theorem and Independence of Path

14.4 Green's Theorem

10/28 = = = THANKSGIVING BREAK

week 15. (12/1, 12/3, 12/5)
14.5 Surface Integrals
14.6 Divergence Theorem
14.7 Stokes' Theorem (time permitting)

Supplemental materials:

Div, Grad, Curl and All That by H.M. Schey
Advanced Engineering Mathematics by Erwin Kreyszig

"il libro della natura e scritto in lingua mathematica"

(The book of nature is written in the language of mathematics)

-- **Galileo Galilei**