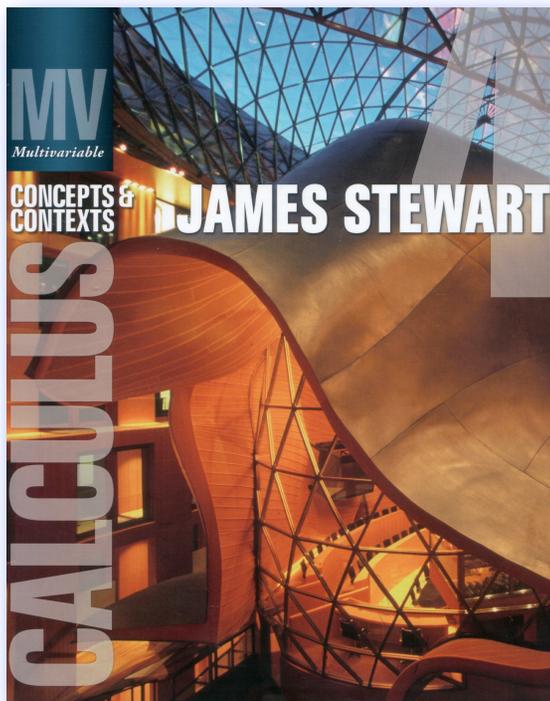


TEXTBOOK



James Stewart, Multivariable
Calculus, 4th edition 2009,
ISBN-10:0-495-56054-5

ORGANISATION

Course head: Oliver Knill

knill@math.harvard.edu

SC 432, Tel: (617) 495 5549

MATHEMATICA

We will have a computer algebra project in this course. Harvard has a cite license for Mathematica a professional and powerful software.

SECTIONS

The course lectures (except reviews and intro meetings) are taught in sections. This assures you can discuss the material in class. Additional problem sessions help too. See other handout. Sections:

MWF 9,MWF 10,MWF 11,MWF 12,
TTH 10-11:30, TTh 11:30-13:00.

MQC

Sun to Thu in 309a, 8:30-10:30PM

DATES

1.EXAM	2.EXAM	FINAL
OCT 2	NOV 6	DECEMBER
7 PM	7 PM	TBA
HALL C	HALL C	TBA

GRADES

PART	PERCENTAGE
1. HOURLY	15
2. HOURLY	15
HOMEWORK	25
LAB	5
FINAL	40

Harvard University Fall 2012

MATH 21A

SYLLABUS 2012

This standard multivariable calculus course extends single variable calculus to higher dimensions. It provides a vocabulary for understanding fundamental equations of nature like weather, planetary motion, waves, heat, finance, or quantum mechanics. It teaches important background needed for statistics, computer graphics, bioinformatics, etc. It provides tools for describing curves, surfaces, solids and other geometrical objects in three dimensions. It develops methods for solving optimization problems with and without constraints. You learn a powerful computer algebra system. The course will enhance problem solving skills and prepares you for further study in other fields of mathematics and its applications.

CALENDAR

SYLLABUS

SU	MO	TU	WE	TH	FR	SA
2	LAB	4	5	6	7	8
9	10	11	12	13	14	15
16	17	18	19	20	21	22
23	24	25	26	27	28	29
30	1	2	3	4	5	6
7	COL	9	10	11	12	13
14	15	16	17	18	19	20
21	22	23	24	25	26	27
28	29	30	31	1	2	3
4	5	6	7	8	VET	10
11	12	13	14	15	16	17
18	19	20	21	22	23	24
25	26	27	28	29	30	1
2	3	4	5	6	7	8
9	10	11	12	13	14	15
16	17	18	19	20	21	22

1. Vector geometry

- coordinates and distance 9.1
- vectors and dot product 9.2-3
- cross product 9.4

2. Functions

- lines/planes/distances 9.5
- level surfaces quadrics 9.6
- curves, velocity acceleration 10.1-2

3. Curves

- arc length curvature 10.3-4
- other coordinates 9.7
- parametric surfaces 10.5

4. Surfaces

- review for first hourly
- first midterm (week 1-3) Oct 2
- continuity 11.1-11.2
- partial derivatives, gradient 11.3

5. Partial derivatives

- Columbus day (no class)
- partial differential equations 11.3
- linear approximation 11.4

6. Gradient

- chain rule implicit differentiation 11.5
- tangent spaces 11.6
- directional derivative 11.6

7. Extrema

- maxima, minima, saddle points 11.7
- Lagrange multipliers 11.8
- more problems, global extrema 11.8

8. Double integrals

- double integrals 12.1-3
- polar integration 12.4
- surface area 12.6

9. Triple integrals

- review for second midterm
- second midterm (week 5-8) Nov 6
- triple integrals 12.7
- spherical integrals 12.8

10. Line integrals

- Veterans day (no class)
- vector fields 13.1
- line integral theorem 13.2

11. Greens theorem

- Greens theorem 13.4
- thanksgiving break
- thanksgiving break

12. Stokes theorem

- curl, div, flux 13.5-6
- Stokes theorem 13.7
- divergence theorem 13.8

13. Overview

- Overview 13.5-8

Reading and Exam period