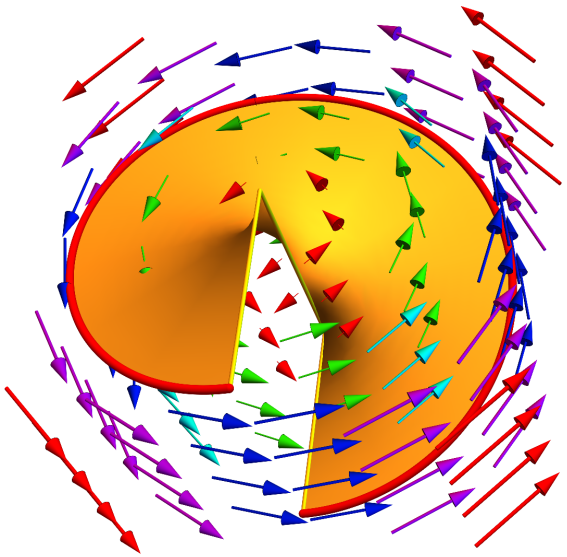

TEXTBOOK

We do not require a textbook. **James Stewart,** Multivariable Calculus is a popular side reading. Any edition.

ORGANISATION

Course head: Oliver Knill

knill@math.harvard.edu

SC 432, Tel: (617) 495 5549

MATHEMATICA

We have a computer algebra project in this course. Harvard has a site license for Mathematica. It is a professional and powerful software.

SECTIONS

The course lectures (except reviews and intro meeting) are taught in sections. This assures you can discuss the material in class. Additional problem sessions are offered too. Lecture sections meet at:

MWF 9,MWF 10,MWF 11, MWF 12, TTh 10-11:30, TTh 11:30-13:00. Please section for one.

MQC

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

EXAM DATES

1.Exam	2.Exam	Final
Sept 27	Nov 1	December
7 PM	7 PM	TBA
Hall B	Hall B	TBA

GRADES

Part	Percentage
1. Hourly	15
2. Hourly	15
Homework	25
Mathematica	5
Final	40

Harvard University Fall 2017

MATH 21A

SYLLABUS 2017

This standard multivariable calculus course extends single variable calculus to higher dimensions. It provides a vocabulary for understanding fundamental processes like weather, planetary motion, waves, heat and analysis in finance, life and social sciences. It teaches important background needed for statistics, computer graphics, bioinformatics, etc. It provides valuable tools for visualization as we study curves, surfaces, solids and other geometrical objects in two and 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 any other fields of mathematics and its applications.

Calendar

S	M	T	W	T	F	S
27	28	29	30	31	1	2
3	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
8	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	9	10	11
12	13	14	15	16	17	18
19	20	21	22	23	25	25
26	27	28	29	30	1	2
3	4	5	6	7	8	9
10	11	12	13	14	15	16

Syllabus

1. Vector geometry

September 4: labour day, September 6 first classes

1 coordinates and distance

2 vectors and dot product

2. Functions

1 cross product lines/planes

2 level surfaces quadrics

3 curves, velocity acceleration

3. Curves

1 arc length, curvature

2 other coordinates

3 parametric surfaces

4. Partial derivatives

1 review for first hourly

first midterm (week 1-3) Sep 27

2 continuity

3 partial derivatives

5. Linear approximation

1 partial differential equations

2 linear approximation

3 chain rule implicit differentiation

6. Gradient

1 Columbus day (no class)

2 tangent spaces

3 directional derivative

7. Extrema

1 maxima, minima, saddle points

2 Lagrange multipliers

3 more problems, global extrema

8. Double integrals

1 double integrals

2 polar integration

3 surface area

9. Triple integrals

1 review for second midterm

second midterm (week 5-8) Nov 1

2 triple integrals

3 spherical integrals

10. Line integrals

1 vector fields

2 line integrals

3 line integral theorem

11. Stokes theorem

1 Greens theorem

2 Curl,Divergence and flux

3 Stokes theorem

12. Divergence theorem

1 Stokes theorem II

2 Thanksgiving (no class)

3 Thanksgiving (no class)

13. Overview

1 Divergence theorem

2 Green-Stokes-Gauss

3 Overview , Outlook

Reading period (2-8) and Exam period (9-20)