Maths
21A 2013

This standard multivariable calculus course extends single variable calculus to higher dimensions. It provides a vocabulary for understanding fundamental processes of nature like weather, planetary motion, waves, diffusion, finance, or quantum mechanics. It teaches important background needed for statistics, discrete math, computer graphics, bio-med, bio-informatics or economics. 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 and visualization skills and prepares you for further study in other fields of mathematics and its applications.

Seminar

Lecture room SC 507

Thu at 1 -2PM and 2PM-3PM

1.Exam	2.Exam	Final
JULY 11	JULY 25	AUG 8
8:30 AM	8:30 AM	8:30 AM
SC Hall E	SC Hall E	SC Hall E

Part	Grade
1. Hourly	20
2. Hourly	20
Homework	25
Lab	5
Final	30

Text

You do not need a book. If you want to see an other angle, take any of the textbooks available. The Stewart Calculus text is a popular option.

Organisation

Oliver Knill, office:Monday 3:30-5

knill@math.harvard.edu

SC 432, Tel: (617) 495 5549

Course Assistants: Stephen Mackereth

smackereth@college.harvard.edu and

Jeremy Marcq, jmarcq@fas.harvard.edu

Lectures

SC Hall E, Tue/Thu 8:30-11:30

CALENDAR

SU	MO	TU	WE	TH	FR	SA
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

First class

Mathematica& Review

Midterm exams

Independence day

Special lecture

Final exam

SYLLABUS

1. Week: Geometry / Space

Lect 1-2   6/25 Space, Vectors, Dot Product

Lect 3-4   6/28 Cross product, Lines/Planes

2. Week: Surfaces / Curves

Lect 5-6   7/2 Implicit /Parametric Surface

Lect 7-8   7/3 Curves, Chain Rule, Arc Length

(this is a one time Wed 12-2 PM lecture, in Hall A)

3. Week: Linearization / Gradient

Lect 9-10   7/9 Partial Derivatives, Review

Lect 11-12 7/11 Midterm. Gradient

4. Week: Extrema / Double Integrals

Lect 13-14 7/16 Tangents, Extrema

Lect 15-16 7/18 Lagrange . Double integrals

5. Week: Triple Integrals /Line Integrals

Lect 17-18 7/23 Double and triple integrals

Lect 19-20 7/25 Midterm Line integrals

6. Week: Vectorfields /Integral Theorem

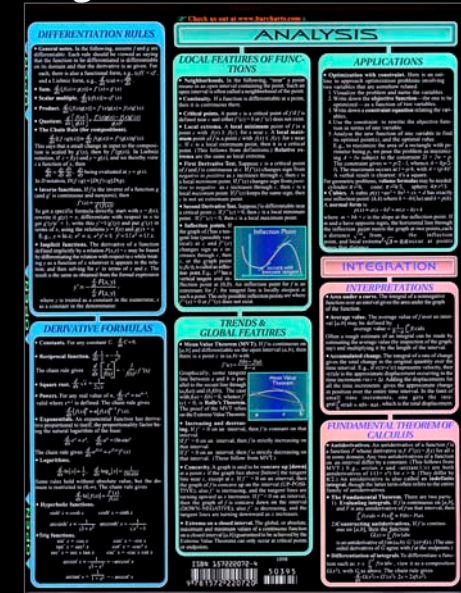Lect 21-22 7/30 Curl, Greens theorem, Flux

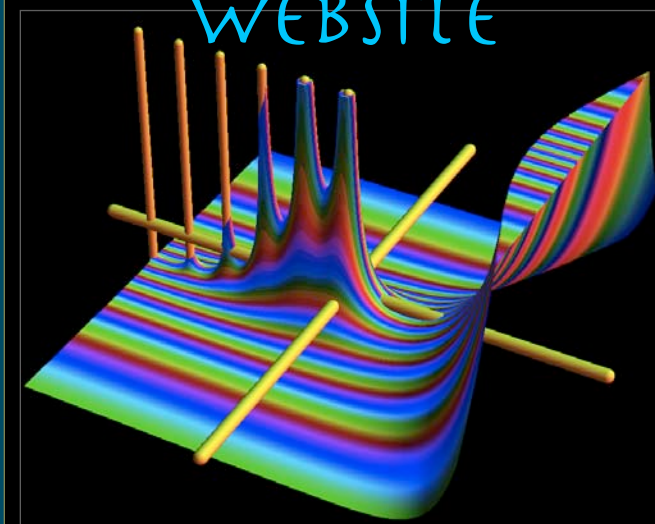Lect 23-24 8/1 Stokes /Divergence theorem

PREREQUISITES

Arithmetic,Algebra,Geometry

Trigonometry

Single Variable Calculus

WEBSITE

math.harvard.edu/~knill/courses/summer2013