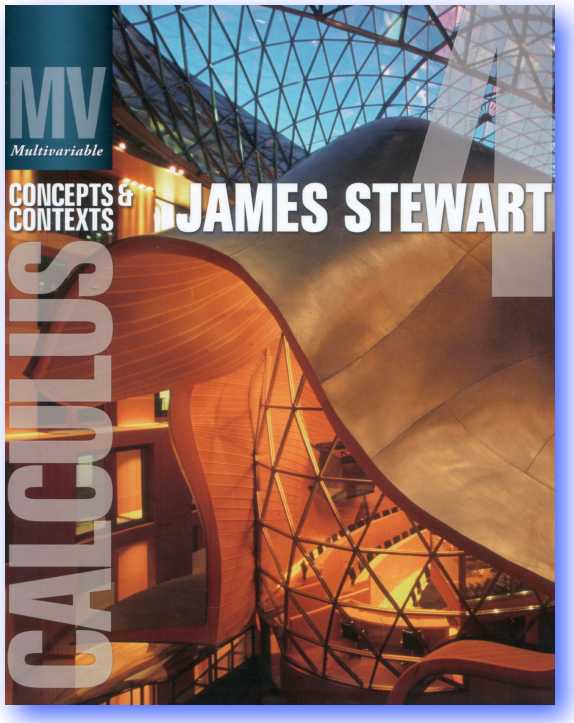
TEXTBOOK



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

ORGANISATION

Course head: Oliver Knill

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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 meeting) are taught in sections. This assures you can discuss the material in class. Additional problem sessions help too. 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

DATES

1.EXAM	2.EXAM	FINAL
SEP 29	NOV 3	DEC ??
7 PM	7 PM	TBA
HALL B	HALL B	TBA

GRADES

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

Harvard University Fall 2015

MATH 21A

SYLLABUS 2015

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 tools for visualization as we study curves, surfaces, solids and other geometrical objects in 2 and 3 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
30	31	1	2	3	4	5
6	7	8	90	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	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

Syllabus

1. Vector geometry		
1	coordinates and distance	9.1
2	vectors and dot product	9.2-3
3	cross product	9.4
2. Functions		
1	lines/planes/distances	9.5
2	level surfaces quadrics	9.6
3	curves,velocity acceleration	10.1-2
3. Curves		
1	arc length curvature	10.3-4
2	other coordinates	9.7
3	parametric surfaces	10.5
4. Partial derivatives		
1	review for first hourly	
	first midterm (week 1-3)	Sep 29
2	continuity	11.1-11.2
3	partial derivatives, gradient	11.3
5. Linear approximation		
1	partial differential equations	11.3
2	linear approximation	11.4
3	chain rule implicit differentiation	11.5
6. Gradient		
1	Columbus day (no class)	
2	tangent spaces	11.6
3	directional derivative	11.6
7. Extrema		
1	maxima, minima, saddle points	11.7
2	Lagrange multipliers	11.8
3	more problems, global extrema	11.8
8. Double integrals		
1	double integrals	12.1-3
2	polar integration	12.4
3	surface area	12.6
9. Triple integrals		
1	review for second midterm	
	second midterm (week 5-8)	Nov 3
2	triple integrals	12.7
3	spherical integrals	12.8
10. Line integrals		
1	vector fields	13.1
2	Line integrals	13.2
3	line integral theorem	13.3
11. Stokes theorem		
1	Greens theorem	13.4
2	Curl,Div,flux	13.5-6
3	Stokes theorem	13.7
12. Divergence theorem		
1	divergence theorem	13.8
2	Thanksgiving (no class)	
3	Thanksgiving (no class)	
13. Overview		
2	Green-Stokes=Gauss	13.7-8
2	Overview	13.5-8

Reading (3-9) and Exam period (10-21)