Math-22B 2018

Linear Algebra and Differential Equations covers more linear algebra, including linear spaces, linear transformations, determinants, multi-linear algebra, eigenvectors, eigenvalues, inner products and linear spaces. The course introduces **discrete dynamical systems** and gives a solid introduction to differential equations, **Fourier series** as well as linear **partial differential equations**. There are also many applications in statistics like **Markov chains** and **data fitting** with arbitrary functions.

Lectures

Science Center, 507

Tue/Thu   9:00-10:15 AM

1.Exam	2.Exam	Final
Feb 26	Apr 9	TBA
9 AM	9 AM	TBA
Hall D	Hall D	TBA

Part	Grade
1. Hourly	20
2. Hourly	20
Homework	20
Proofs	10
Final	30

Proof Seminar

TBA. Fri 9, 12:30 and 3 Pm,

Yongquan Zhang: yqzhang@math

We are committed to an accessible academic community. For details see the Accessibility Office.

Text

The handouts and lectures are all you need.

Organisation

Oliver Knill, office hours TBA SC 432

knill@math.harvard.edu, Tel: (617) 495 5549

TF's

Elliot Parlin,	elliotparlin@college
Forrest Fletscher	forrestflesher@college

Academic Integrity

We strictly follow the Harvard College school policies. Students are responsible to know the rules and guidelines.

Prerequisites

Multivariable Calculus

CALENDAR

SU	MO	TU	WE	TH	FR	SA
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	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

■ Exams   ■ Start/Stop

SYLLABUS

1. Week: Linearity
Unit   1/29 Linear Spaces
Unit   1/31 Linear Transformations

2. Week: Basis
Lect 3 2/5 Basis and dimension
Lect 4 2/7 Coordinate change

3. Week: Orthogonality
Lect 5 2/12 Gam-Schmidt
Lect 6 2/14 Orthogonal group

4. Week: Determinants
Lect 7 2/19 Data fitting
Lect 8 2/21 Determinants

5. Week: Multi-linear algebra
Lect 9 2/26   First hourly
Lect 10 2/28 Characteristic Polynomial

6. Week: Spectral theorem
Lect 11 3/5 Diagonalization
Lect 12 3/7 Spectral Theorem

7. Week: Dynamical systems
Lect 13 3/12 Discrete Systems
Lect 14 3/14 Continuous systems

8. Week: Nonlinear Systems
Lect 15 3/26 Higher order systems
Lect 16 3/28 Nonlinear Systems

9. Week: Oscillators
Lect 17 4/2 Operator method
Lect 18 4/4 Oscillators

10. Week: Fourier
Lect 19 4/9 Second hourly
Lect 20 4/11 Fourier series

11. Week: More Fourier
Lect 21 4/16 Parceval
Lect 22 4/18 PDE's

12. Week: Heat and Wave
Lect 23 4/23 Heat
Lect 24 4/25 Wave

13. Week: Applications
Lect 25 4/30 Applications

WEBSITE

math.harvard.edu/~knill/teaching/math22b2018