

**67-346/546 LINEAR ALGEBRA
FALL 2009**

Section 01: 12:40-1:40

MWF

Swart 303

INSTRUCTOR: ZOUBIR BENZAID

OFFICE: Swart 238

PHONE: 424-7354 (O)

OFFICE HOURS: MWF: 11:30-12:30 and 1:45-2:45.
(And by appointment)

TEXTS:

Linear Algebra by S. Lang, 3rd Edition (Required)

Schaum's Outline of Linear Algebra by Lipshutz & al. (Recommended)

CALCULATOR & SOFTWARE:

TI 85 or TI 86 is recommended. We will also be learning how to use mostly Maple13 and some Matlab to do some basic Linear Algebra computations. For those of you that are interested and have their own PC, I highly recommend buying a copy of the student edition of Maple 13. If you need more information, please talk to me.

D2L WEBSITE: I will try to maintain a D2L website for this course. The site will contain the syllabus, homework assignments, solutions to tests, solutions to selected homework problems, Maple 11 worksheets, miscellaneous lecture notes and links to other interesting Linear Algebra sites.

TOPICS: We will be covering the following material from chapters 1 to 10:

Chapter 1: Bases, Dimension of a Vector Space, Sums and direct Sums.

Chapter 2: Space of Matrices, Linear Equations.

Chapter 3: Mappings, Linear Mappings, Kernel and Range of a Linear Map, Composition and Inverse of Linear Mappings.

Chapter 4: Linear Map Associated with a Matrix, Matrix Associated with a Linear Map, Basis, Matrices and Linear Maps.

Chapter 5: Scalar Products, Orthogonal Bases, Bilinear Maps and Matrices, General Orthogonal Bases, Dual Spaces, Quadratic Forms, Sylvester's Theorem.

Chapter 6: Determinants

Chapter 7: Symmetric, Hermitian and Unitary Operators.

Chapter 8: Eigenvalues, Eigenvectors, Characteristic Polynomial, Diagonalization of a Symmetric Linear Map.

Chapter 9: Polynomial and Matrices

Chapter 10: Triangulation of Matrices and Linear Maps and Jordan Normal Form.

Lecture Notes: Important Matrix Decompositions: LU, QR, Singular Value Decomposition and Applications of Linear Algebra.

COURSE OBJECTIVES: Master basic concepts, techniques and some applications of Linear Algebra. Develop more insight into conceptual thinking and proofs. Be able to explain ideas at the board and on some occasional essays in homework and exams. Use Maple and/or Matlab to enhance understanding and to allow for more realistic applications and examples.

EXAMS: There will be three exams (75%)

HOMEWORK, QUIZZES: Homework will be assigned each class, discussed some. Selected homework problems will be collected and graded. There will be some in-class quizzes. (20%)

CLASS PARTICIPATION: Class participation includes regular class attendance, asking and answering questions, presenting problems and solutions to the class. (5%)

GRADING:

$A: [90, 100]$, $A^-: [88, 90)$, $B^+: [86, 88)$, $B: [80, 86)$, $B^-: [78, 80)$, $C^+: [76, 78)$, $C: [70, 76)$
 $C^-: [68, 70)$, $D^+: [66, 68)$, $D: [62, 66)$, $D^-: [60, 62)$, $F: [0, 60)$.

MAKE-UPS: Allowed only in emergency situations. Under no circumstances will a student be allowed to make up more than one exam.

CLASS POLICY: Please relax, feel free to ask and answer questions and actively participate in the learning process. I do expect you to consult each other when working the homework problems; however what you submit must be your own work. To check that everyone is doing his/her share of work, I will be asking people to present some problems on the board.

The homework sets constitute the most important part of the course. That is where, ideally, most of the learning is going to take place. You should write down your solutions very carefully. Be neat, write legibly and make full sentences. The end product should be work you are proud of. Do not use spiral paper. I will not accept papers that are illegible or just plain messy. Your papers will be graded on the basis of correctness of mathematics, logic, grammar and legibility.

GRADUATE STUDENTS: The students enrolled in 576, will be expected to demonstrate a deeper understanding of the course material. More specifically:

1. They will be expected to know the proofs of several of the fundamental theorems of linear algebra.
2. Homework sets and tests will include a number of more challenging theoretical and/or applied problems.
3. Class presentations will be graded at a higher level.