SYLLABUS

MA242 Linear Algebra

Professor: Steve Rosenberg
Office: MCS 248; phone 3-9556
Office Hours: Wednesday 11-12, 1-3 or by appointment
Course Hours: T/Th 3:30-4:45 in MCS B33; discussion T 12:30-1:20 in MCS B33
Website: math.bu.edu/people/sr
Course Website: Blackboard via learn.bu.edu
Email: s@math.bu.edu; Be sure to check your Blackboard regularly for course announcements.

Material: The course will cover the basic concepts of systems of linear equations and their solutions. The
first half of the course will emphasize calculational techniques, with applications to physics, applied math-
ematics, economics and engineering. The second half of the course will cover matrices as linear transfor-
mations on vector spaces. We will cover Chapters 1-5 and further topics if time permits.

Grading: There will be two in-class exams and a final. There will be a brief quiz at the beginning of each
discussion section. The in-class exams each count for 20% of the grade, the final counts for 20%, the quizzes
count for 10%, and homework counts for 30%. The only acceptable excuses for missing an exam, quiz or
homework due date are legal reasons such as jury duty, substantiated illness, family emergency or religious
reasons. Make-up exams for in-class exams are not given. If you miss an in-class exam for an acceptable
reason, your remaining in-class exam will count for 40% of your grade.

Homework: The homework assignments are listed below. Homework will be due one week after it is
assigned. Late homework will not be accepted. Since the answers to the odd-numbered problems are in the
back of the book, you must give complete answers on all problems to receive credit. I cannot emphasize
enough the importance of doing the homework problems – I think it is impossible to do well in the course
without keeping up with the homework. You are welcome to work with others on your homework.

Computer packages: Some homework problems will involve computer calculations. Go to the book’s web-
site at http://wps.aw.com/awlay_linearalgebra_5/ and click on student resources to find introductions
to computer algebra packages (Getting Started with Technology in the left hand column) such as Maple,
Mathematica and Matlab. You can download all data sets to avoid tedious typing in of data by clicking on
Data Sets in the left hand column. Free student versions of Matlab and Mathematica are available if you
log onto your BU account at the computer lab Common@Mugar at Mugar Library. Once you log on, hit the
Start button, then select Run, then enter Matlab or Mathematica. Both programs come with tutorials.

For remote access to Matlab and Mathematica, you will need to get an account on the scc-lite.bu.edu
server. You will need to install X window software on your computer. Information on getting an scc-lite
account and free versions of X window software for PCs and Macs are available at
http://www.bu.edu/tech/services/support/desktop/computer-labs/unix/

You can use another system (such as TI-86, TI-83, etc.) if you prefer. Perhaps the best system is
Wolfram Alpha, which has worked linear algebra examples at

Cheating: Boston University’s policies on cheating and plagiarism are spelled out in the BU Academic Con-
duct Code, available at http://www.bu.edu/academics/resources/academic-conduct-code/, and will be
followed in this class.

Cell phones and laptops: No use of laptops, cell phones, smart phones, texting, etc. in class.
Outline of Contents

Chapter 1. Linear Equations in Linear Algebra
1.1 Systems of Linear Equations  Hwk: #1,5,8,9,14,19,30,33,34
1.2 Row Reduction and Echelon Forms  Hwk: #1,6,9,16,25,26,33,34
1.3 Vector Equations  Hwk: #1,4,5,8,9,12,27,28,29
1.4 The Matrix Equation $Ax = b$  Hwk: #1,5,7,10,12,13,17,20,26,31,35
1.5 Solution Sets of Linear Systems  Hwk: #1,5,8,11,13,16,18,36
1.6 Applications of Linear Systems  Hwk: #3, 12, 14
1.7 Linear Independence  Hwk: #1,6,19,20,31,32,40
1.8 Intro to Linear Transformations  Hwk: #1,4,9,11,14,16,19,22,23,25,29
1.9 The Matrix of a Linear Transformation  Hwk: #1,6,7,8,12, 18, 24
1.10 Business, Science, Engineering Applications  Hwk: #2,8,10, 11

Chapter 2. Matrix Algebra
2.1 Matrix Operations  Hwk: #1,4,5,23,24,28,30,31,33
2.2 Inverse Matrix  Hwk: #1,5,7,10bc,12,21,22,40
2.3 Characterizations of Invertible Matrices  Hwk: #1,5,10,16,26,32
2.7 Computer Graphics  Hwk: #1,3,4,5,8,11,15,16,17,18,21

Test 1, Thursday, October 19*

Chapter 3. Determinants
3.1 Introduction to Determinants  Hwk: #1,2,9,10,15,16,38,41
3.2 Properties of Determinants  Hwk: #5,11,15,17,19,28, 29
3.3 Cramer’s rule, etc.  Hwk: #19,21,23,32

Chapter 4. Vector Spaces
4.1 Vector Spaces and Subspaces  Hwk: #1,3,4,5,6,9,11,14,16,19,20,21,27
4.2 Null spaces, etc.  Hwk: #1,5,6,7,16,29,31,33,34,38,39
4.3 Bases  Hwk: #1,8,11,14,33
4.4 Coordinate Systems  Hwk: #1,8,9,12,13,17,21,28,36
4.5 Dimension of a Vector Space  Hwk: #1,8,9,12,13,20,21,24,27,29,34
4.7 Change of Basis  Hwk: #1,4,6,9,13,14,17,18
4.9 Applications to Markov Chains  Hwk: #1,4,5,7,15

Test 2, Thursday, November 30*

Chapter 5. Eigenvalues and Eigenvectors
5.1 Eigenvectors and Eigenvalues  Hwk: #1,6,11,22abd,31,37,38
5.2 The Characteristic Equation  Hwk: #1,10,13,20,21,24 30
5.3 Diagonalization  Hwk: #1,6,11,22,23,28,31,33
5.5 Complex Eigenvalues  Hwk: #1,7, 8, 13, 27
5.6 Discrete Dynamical Systems  Hwk: #1,3,4,5,9,10,16

Chapter 6. Orthogonality and Least Squares
6.1 Inner Product, etc.  Hwk: #1,4,7,11,14,17,20,30
6.2 Orthogonal Sets  Hwk: #1,8,11,14,17,24,26,27
6.3 Orthogonal Projections  Hwk: #1,4,7,11,14,17,25
6.4 Gram-Schmidt  Hwk: #1,9,24
6.5 Least-Squares Problems  Hwk: #1,3,5,7,10
6.6 Applications to Linear Models  Hwk: #1,7,8,10,11

Final Exam: Tuesday, December 19, 3-5 pm

*Warning: The dates of the in-class exams may be changed.