

Math 7 Elementary Linear Algebra

- Class meets Tuesdays and Thursdays in Room 502
 - ◆ Lecture 11:00 a.m. – 12:15 p.m.
 - ◆ Lab 12:25 – 1:15 p.m.
- Instructor: (Mrs.) Teresa (Teri) Henson
- Scheduled Office Hours:
 - ◆ Monday, 7:20 – 7:45 p.m., Room 505 (classroom)
 - ◆ Tuesday, 9:30 – 10:20 a.m., Room 2185 (office)
 - ◆ Tuesday 5:00 – 5:50 p.m., Room 600 (ILC)
 - ◆ Wednesday, 1:00 – 1:50 p.m., Room 2185 (office)
 - ◆ Wednesday, 7:20 – 7:45 p.m., Room 505 (classroom)
 - ◆ Thursday, 9:30 – 10:20 a.m., Room 2185 (office)
 - ◆ Office hours also available by appointment
- Integrated Learning Center, Building 600
 - ◆ Thursday, 5:00 – 6:00 p.m.
- Office: Building 2100, Room 2185
- Office Telephone: 424-1349
- E-mail: thenson@laspositascollege.edu
- Mailbox: Building 100
- Instructor website: from the LPC home page, select the Faculty+Staff link at the top of the page, then click on the Faculty Websites link in the left-hand column of the Faculty & Staff page, scroll down to find Mathematics and click on Mathematics (Henson) or type in this URL: <http://lpc1.clpccd.cc.ca.us/lpc/math/thenson.htm>
- Mathematics Department website: from the LPC home page, select “Academic Programs” under “Quicklinks” (left-hand column), then scroll down to find the “Mathematics” link under the “Mathematics, Engineering and Science” header or type in this URL: <http://www.laspositascollege.edu/math/index.php>

Making mistakes is a natural part of learning mathematics.

David R. Johnson

SYLLABUS

TEXTBOOK: *Elementary Linear Algebra* by Ron Larson, and Falvo, David C. Sixth Edition, Brooks/Cole, Cengage Learning, 2009.

MATERIALS: A **TI-83** (or comparable) calculator is required for this course.

COURSE DESCRIPTION: Math 7 is an introduction to linear algebra including: techniques and theory needed to solve and classify systems of linear equations using Gaussian elimination and matrix algebra; properties of vectors in n-dimensions; generalized vector spaces, inner product spaces, basis, norms, orthogonality; eigenvalues, eigenspaces; and linear transformations. It includes selected applications of linear algebra, including the use of MATLAB™ to solve problems involving advanced

numerical computation. Prerequisite: Mathematics 2 (completed with a grade of C or higher). 3 hours lecture, 2 hours laboratory.

COURSE CONTENT: We will cover most of the material in Chapters one through seven; some applications will be omitted.

COURSE OBJECTIVES: Course objectives are a summary of the knowledge and skills you should have after successfully completing this course. Upon completion of this course, the student should be able to:

1. solve systems of linear equations using any of the following methods: elimination, inverse or LU factorization;
2. determine whether a linear system is consistent or inconsistent, and for consistent systems, characterize solutions as unique or infinitely many;
3. apply the algebraic properties of vectors and matrices to simplify expressions and to write proofs;
4. perform operations with vectors and matrices;
5. compute the transpose, determinant, and inverse of matrices if defined for a given matrix;
6. recognize and use the properties of vector spaces and inner products spaces;
7. define subspace, inner product space, linear independence, basis, spanning set, and orthogonality;
8. determine if a given set of vectors is a subspace of a vector space;
9. define a linear transformation and represent it using matrix multiplication;
10. recognize and use the properties of linear transformations;
11. compute the characteristic polynomial, eigenvalues, eigenvectors and eigenspaces for a given matrix;
12. construct orthogonal and orthonormal bases for a given basis;
13. construct the orthogonal diagonalization of a symmetric matrix;
14. use basic MATLAB™ command and functions to perform matrix operations;
15. investigate and solve linear algebra applications using MATLAB™.

STUDENT LEARNING OUTCOMES:

Upon successful completion of Math 7, a student should be able to do the following:

- Given a set of objects together with operations of addition and scalar multiplication, determine, using vector space axioms, whether the set constitutes a vector space; give reasons for conclusions (*Communication*)
- find a set of linear independent vectors (*Problem Solving*)
- construct a least squares model (*Modeling*)
- use MATLAB to solve a least squares problem (*Technology*)

HOMEWORK: Most students think of homework as doing the assigned exercises in the text, but it is much more than that. To be successful in this course, it is essential that you spend time reading and reflecting on the material presented in the text, as well as doing the assigned section exercises. I recommend you take reading notes on each section and that after completing the exercises for that section, you write a brief summary of what you

have learned, focusing on the key concepts, definitions, theorems and skills introduced. Your reading notes and section summaries can be a valuable resource when you are reviewing for your exams. **Homework is your responsibility.** Section exercises will not be collected.

EVALUATION and COURSE GRADES: Your grade in this course will be based on lab assignments, exams, and other course work as explained below. **Extra-credit assignments are not given.** You are expected to complete all assignments on time. Unless noted otherwise, **late work will NOT be accepted.** It is expected that all work will reflect your own individual effort and no one else's.

Attendance and active participation in class and lab are important parts of the math learning experience. It is expected that while in class and lab you will give your full attention to the subject matter at hand. You should not work on homework for this or any other course while in the classroom, unless directed otherwise.

COURSE WORK: Course work consists of class exercises, lab assignments and graded homework exercises.

Graded Homework Exercises (100 points). Graded homework exercises are problems assigned for you to work and hand in; usually they will be taken directly from the text. These problems will be graded; you have the option of correcting exercises for which you did not receive full credit. Corrections must be handed in by the next class period after the problem is returned to you. Late work may be accepted at my discretion; I reserve the right to refuse to accept late work. Late work **will not be accepted** if you have not first spoken to me about submitting your work late. Credit for graded homework will be given based on the percentage of completed exercises. For instance, if you complete correctly 90% of the graded homework exercises required for the semester, you will receive 90% of the possible points. You may miss up to 5% of the graded homework exercises without penalty.

Class Exercises and Lab Assignments (250 points). Graphing calculators and MatLab™ will be used to solve a variety of applied problems in linear algebra. Part of the lab time will be devoted to instruction in MatLab™.

Class Exercises (125 points) may consist of individual or small-group work conducted either during lecture time or during lab time. Individuals or groups may be asked to present their results to the class. **There are no make-ups on missed Class Exercises.** Incorrect work can be corrected for full credit. You may miss two exercises without penalty.

Lab Assignments (125 points) will involve more complex uses of linear algebra and technology. Your grade will be based on the completeness and correctness of your work. Incorrect work can be corrected for full credit. In general, no late work will be accepted; however, if you are unable to complete a particular lab assignment, you

should contact me and discuss the circumstances. Additional time may be granted if the situation warrants it. I reserve the right to refuse to accept late work.

EXAMINATIONS: You will take three in-class exams and a comprehensive final.

In-Class Exams (450 points). Each in-class exam will be worth 150 points. You may bring into each exam a 3"x5" card containing formulas, definitions, *etc.* Only one side of the card may be used. The information on the card must be hand-written. No exams will be dropped, but you may replace your lowest, **nonzero** exam score with your average on the final, provided that your final exam average is 70% or better. For instance, suppose your lowest in-class exam score is 99 (66%) and your final exam percentage is 72%. I would take 72% of 150, which yields 108, and replace your 99 with the 108. If you miss an exam and do not make it up, you will receive a score of zero for that exam. **You may not use your final exam to replace a zero exam score.**

Make-up Policy. If you miss an exam, you will be allowed to make it up, subject to the following conditions:

- You have made arrangements to take a make-up prior to the test date; **or**
- In the event of an emergency, you contact me within 24 hours of the test and can provide written documentation supporting your reason for missing the test.
- The make-up exam must be taken at the time and place designated by me, generally before the next class meeting, unless otherwise arranged.
- Only one make-up exam will be allowed.

I reserve the right to refuse to allow a make-up exam.

Final Exam (200 points). A comprehensive Final Exam will be given on Thursday, May 24, 9:30 – 11:20 a.m. The final exam will be worth 200 points. Failure to take the Final Exam will result in a grade of ``F". You may have a half-page ``help sheet" (one side of half of a sheet of paper) for the final; the ``help sheet" must be hand-written and must be turned in with your exam.

ALL Examinations are *closed-book* and *closed-note*, with the exception of the note-card or "help sheet". Unless stated otherwise, a calculator may be used. MatLab™ may not be used on exams.

COURSE GRADES: To receive a passing grade in this course your combined average on all three exams plus the final must be 70% or better. If you have a passing exam average, then your letter grade in this course will be assigned based on the total number points you have earned as follows.

Total Points	Letter Grade
900 – 1000	A
800 – 899	B
700 – 799	C
600 – 699	D
< 600	F

If you do not have a passing exam average at the end of the semester a letter grade of D or F will be assigned.

POLICIES: These policies reflect established Las Positas College rules and procedures.

Attendance. Attendance is your responsibility. You are required to attend class every day. Each day you miss will count against you. Please talk with me if you run into any attendance problems. Note that arriving late or leaving early counts as an absence. The Las Positas College attendance policy will be observed: If you are absent for a total of four consecutive or six cumulative instructional hours and/or two consecutive weeks, you may be dropped from the class at my discretion. (An instructional hour is 50 minutes.)

If you want to drop this class or any other, however, be sure to do it yourself at the Office of Admissions and Records so that it is recorded by the deadline.

Behavior. It is expected that you will follow the **Student Conduct Policy** found in the Las Positas College Catalog; you are responsible for reading and understanding this policy. I highlight a few of the rules here.

Courteous and respectful behavior is expected at all times.

Cheating will not be tolerated; anyone caught cheating on an exam will receive 0 points for the exam and may be referred to the Dean of Students. This exam cannot be replaced by the final exam. If you submit someone else's work as your own, that is cheating and you will not receive credit for the work submitted.

Pagers and cell phones should be turned off while in the classroom.

Children are not allowed in the classroom by law. Please do not bring visitors to the classroom unless you have cleared it with the instructor before the class begins. Absolutely no visitors are allowed in the classroom during an exam.

Instructor Absence. In the event that an emergency occurs and I am unable to make it to class, I will report my absence to the Faculty Absence and the absence will be posted on the LPC home page. However, if the class is not posted, but I do not arrive by 11:15 a.m. you may assume the class is cancelled. Should this (extremely unlikely) event occur on the day of a scheduled exam, then the exam will be given at the next class meeting.

IMPORTANT DATES

Tuesday, January 17	Instruction begins
Friday, February 3	Last day to ADD or drop NGR in person
Sunday, February 5	Last day to ADD or drop NGR via CLASS-Web
Friday, February 17 – Monday, February 20	Presidents Weekend (no instruction)
Thursday, March 29	Office hour and class cancelled (Faculty "Flex" day)

Friday, April 6	Last day to withdraw with a "W"
Monday, April 9 – Saturday, April 14	Spring Break (<i>no instruction</i>)
Friday, May 18	Last Day of Classes
Thursday, May 24	Final Exam, 9:30 – 11:20 a.m.

NOTE: The instructor reserves the right to change this syllabus after giving due notice of the change.

PLEASE KEEP THIS PAPER FOR FUTURE REFERENCE.