San Diego Community College District
Mesa College
Course Syllabus, Summer 2018

Subject Area and Course Number: Mathematics 254
Course Title: Introduction to Linear Algebra **Units:** 3
Class Meets: Monday - Thursday 12:45 PM - 2:10 PM, room MS422 **CRN:** 94888
Instructor: Russell La Puma **Office:** MS222E
Voice mail: (619) 388-2767 x5503 **Office Hours:** M-Th 2:30 PM - 3:30 PM
Web: http://homework.sdmesa.edu/rlapuma **E-mail:** lapumath@gmail.com

Prerequisite: Math 151 with a grade of "C" or better, or equivalent.

Course Description: This course serves as an introduction to the theory and applications of
elementary linear algebra, and is the basis for most upper division courses in
mathematics. The topics covered in this course include matrix algebra, Gaussian
Elimination, systems of equations, determinants, Euclidean and general vector spaces,
linear transformations, orthogonality and inner product spaces, bases of vector spaces, the
Change of Basis Theorem, eigenvalues, eigenvectors, the rank and nullity of matrices and
introduction to linear transformations. This course is intended for the transfer student
planning to major in mathematics, physics, engineering, computer science, operational
research, economics, or other sciences.

Student Learning Objectives:
Upon successful completion of the course the student will be able to:
1. Solve systems of linear equations using several algebraic methods.
2. Construct and apply special matrices, such as symmetric, skew-symmetric, diagonal,
upper triangular or lower triangular matrices.
3. Apply all the algebraic matrix operations, including multiplication of matrices,
transposes, and traces.
4. Calculate the inverse of a matrix using various methods, and perform application
problems involving the inverse.
5. Compute the determinant of square matrices and use the determinant to assess
invertibility.
6. Derive and apply algebraic properties of determinants.
7. Perform vector operations on vectors from Euclidean Vector Spaces including vectors
from R^n.
8. Compute the equations of lines and planes and express them in vector form.
9. Perform linear transformations in Euclidean vector spaces, including basic linear
operators, and determine the standard matrix of the linear transformation.
10. Derive whether a given structure is a vector space and identify whether a given subset
of a vector space is itself a vector space.
11. Analyze whether a set of vectors spans a space, and if such a set is linearly dependent
or independent.
12. Assess if a set of functions is linearly independent using various techniques including
calculating the determinant of the Wronskian.
13. Solve for the basis and the dimension of a vector space.
14. Determine the rank, the nullity, the column space and the row space of a matrix.
15. Identify orthogonality between vectors in an abstract vector space by means of an
inner product, and compute the inner product between vectors of any inner product space.
16. Calculate the QR-decomposition of a matrix using the Gram-Schmidt process.
17. Express a vector space via change of base, including computation of the transition
matrix and determining an orthonormal basis for the space.
18. Compute all the eigenvalues of a square matrix, including any complex eigenvalues,
and determine their corresponding eigenvectors.
19. Assess if a square matrix is diagonalizable and derive the diagonalization of a matrix

whose eigenvalues are easily calculated.

20. Apply linear transformations among abstract general vector spaces, and derive the rank, the nullity and the associated matrix of the transformation.

21. Prove basic results in linear algebra using appropriate proof-writing techniques such as linear independence of vectors; properties of subspaces; linearity, injectivity and surjectivity of functions; and properties of eigenvectors and eigenvalues.

Course Learning Outcome:

Students will be able to orthogonally diagonalize a 3x3 symmetric matrix.

Students will be able to find bases for the three fundamental subspaces of a matrix (rowspace, colspace, and nullspace).

Evaluation: There will be three tests and a final examination. To avoid the need for make-up tests, the score of any missed test will be dropped and the final and remaining tests given extra weight. There will be no make-up tests. There will be short quizzes tentatively scheduled for every other class meeting, with the lowest two quiz scores dropped. Homework will be assigned and will be collected on test days. The final grade will be determined as 90-100% A, 80-89% B, 70-79% C, 60-69% D, with the following weights in effect:

Homework	10%	
Quizzes	10%	
Tests, best two @	24%	each
Test, worst	8%	
Final	24%	

Text/Calculators: *Elementary Linear Algebra,* 8th Ed., Ron Larson, ISBN: 978-1-305-65800-4. A graphing calculator (e.g. TI-84) is highly recommended. You will be allowed to use a calculator on any test unless otherwise directed.

Attendance Requirements: A student accumulating unexcused absences of more than 6% of the total hours that the class meets (equal to two class meetings) may be dropped by the instructor. If there are unexcused absences of more than 12% (four class meetings), district rules state the student *must* be dropped. The withdrawal deadline is **July 20**. Any student still enrolled in the course after that date cannot receive a "W." It is the student's responsibility to add, drop, or withdraw from classes before course deadlines.

Tardiness: Class begins at the set hour. It is understood that tardiness is occasionally unavoidable, but chronic tardiness disrupts the learning environment. Likewise, it is usually inappropriate to leave before the end of class without consulting the instructor. If the instructor is more than twenty minutes late, students may leave after signing an attendance sheet.

Classroom Behavior and Student Code of Conduct: Students are expected to respect and obey standards of student conduct while in class and on campus. The student Code of Conduct, disciplinary procedure, and student due process (Policy 3100, 3100.1, and 3100.2) can be found in the current college catalog. Under most circumstances, food, beverages, and phones, are unnecessary and unwelcome in the classroom.

Collaboration and Cheating: You are encouraged to work with tutors or other students on homework and class topics, provided you share learning, not just answers. (Consider attending the MT2C Math & Science Tutoring, LRC 4th floor.) Collaboration on exams or quizzes, however, is regarded as cheating and will result in a zero for that exam.

Accommodation of Disability: Students with disabilities who may need academic accommodations should discuss options with their professors during the first two weeks of class.

Math 252 – La Puma – Summer 2018				
week	Mon	Tue	Wed	Thu
1	Jun 18 intro 1.1	Jun 19 1.2	Jun 20 1.2 1.3	Jun 21 2.1
2	Jun 25 2.2 2.3	Jun 26 2.3 2.4	Jun 27 2.4	Jun 28 3.1 3.2
3	Jul 2 3.3	Jul 3 **Test 1**	Jul 4 *Independence Day*	Jul 5 4.1 4.2
4	Jul 9 4.2 4.3	Jul 10 4.4	Jul 11 4.5	Jul 12 4.6
5	Jul 16 4.7	Jul 17 5.1 5.2	Jul 18 5.2 5.3	Jul 19 **Test 2** *Withdrawal deadline 7/20*
6	Jul 23 6.1	Jul 24 6.2	Jul 25 6.3	Jul 26 6.4
7	Jul 30 7.1	Jul 31 7.2	Aug 1 7.3	Aug 2 **Test 3**
8	Aug 6 8.4	Aug 7 8.5	Aug 8 review and catch up	Aug 9 **Final**

Schedule subject to change with prior notice.