Massasoit Community College
Course: **Linear Algebra**
Course Number: MATH 229 - xx
Semester:
Classroom:
Day and Time:
Instructor:
Office:
Email:
Phone:
Office Hours:

Course Description:
This course is designed to introduce students to the theory of systems of linear equations and to mathematical proof. Topics include solving systems of linear equations, linear independence, linear transformations, matrix operations, determinants, vector spaces, eigenvalues and eigenvectors, and applications. Prerequisite: C- or higher in MATH222 Calculus II; waiver by placement testing results; or departmental approval.

Required Text and Materials:
Textbook: Linear Algebra and its Applications,5th edition by David Lay, Steven Lay, and Judi McDonald.
Calculator: TI-83 or 84 required. You may not use a cell phone, tablet, or computer as a calculator.

Teaching Procedures:
This course will be taught in a lecture/discussion format with ample opportunity for student questions. Generally, class will begin with a question and answer session on the most recent homework assignment. New material will then be presented in a lecture format and homework be assigned to reinforce the topics covered in class.

Classroom Behavior: Disruptive classroom behavior, including cell phone use and talking with classmates while new material is being presented, will **not be tolerated**, and will result in removal from the class. If you are expecting an important call, please make sure your phone is set to vibrate and step into the hall. Please be respectful of the classroom setting.

COURSE OUTCOMES

COURSE OUTCOMES	**SAMPLE OUTCOMES ACTIVITIES**	**SAMPLE ASSESSMENT TOOLS**
Upon successful completion of this course students should:	To achieve these outcomes students may engage in the following activities:	Student learning may be assessed by:
1. Solve systems of linear equations and interpret their results; (QL)	• Write systems of linear equations in matrix form • Determine when a system of linear equations is consistent • Solve systems of linear equations using row reduction and give parametric descriptions of solution sets • Solve applications of linear systems	• Homework • In-class problem sets • Quizzes • Exams

2. Describe properties of linear systems using vectors; (QL)	• Geometrically interpret vectors in R^2 and R^3 • Use and verify algebraic properties of vectors in R^n • Determine whether a vector can be written as a linear combination of a set of other vectors • Find and give a geometric interpretation of the span of a set of vectors • Determine if a set of vectors are linearly independent	• Homework • In-class problem sets • Quizzes • Exams
3. Demonstrate an understanding of linear transformations; (QL)	• Understand the connection between matrix transformations and linear transformations • Find the image of a vector under a transformation • Find the standard matrix of a linear transformation • Show how images can be reflected, contracted, expanded, sheared, and projected using transformations.	• Homework • In-class problem sets • Quizzes • Exams
4. Perform and interpret matrix operations; (QL)	• Understand properties, proofs, and computations involving matrix addition, multiplication, and transposes • Determine when a matrix is invertible and calculate its inverse • Use properties and characterizations of an invertible matrix for proofs	• Homework • In-class problem sets • Quizzes • Exams
5. Compute and interpret determinants of matrices; (QL)	• Compute determinants of square matrices using row reduction and cofactor expansion • Use determinants to show if a set of vectors is linearly independent	• Homework • In-class problem sets • Quizzes • Exams
6. Demonstrate an understanding of vector spaces and subspaces; (QL)	• Define a vector space and a subspace of a vector space • Compare and contrast the null space and column space of a matrix • Find a basis and the dimension of the subspace spanned by given vectors • Examine how to impose a coordinate system on a vector space • Find dim Nul A, dim Row A, dim Col A, and/or rank A for a matrix A	• Homework • In-class problem sets • Quizzes • Exams
7. Demonstrate an understanding of eigenvalues and eigenvectors; (QL)	• Find the basis for the eigenspace corresponding to a given eigenvalue • Use the characteristic equation of a square matrix to calculate its eigenvalues • Find eigenvectors corresponding to eigenvalues	• Homework • In-class problem sets • Quizzes • Exams

This course includes the following core competencies: Quantitative Literacy (QL)

Basis for Student Grading: Grades for this course will be assigned as follows:

Grade	Average
A	93%-100%
A-	90%-92%
B+	87%-89%
B	83%-86%
B-	80%-82%
C+	77%-79%

Grade	Average
C	73%-76%
C-	70%-72%
D+	67%-69%
D	63%-66%
D-	60%-62%
F	0-59%

The grade you earn is the grade you will receive in this course. Grades are not negotiable. You will not be allowed to make up work, substitute alternative assignments, or submit extra assignments in order to improve your grade during the semester or after the semester ends.
Grades of incomplete are given only in situations when extenuating circumstances prevent a student from taking the final exam or fulfilling a specific requirement in the course. The grade of "I" cannot be used to give students additional time to complete course assignments in order to raise their grade.

Homework/Quizzes:
The online homework exercises and Quizzes are assigned via MyMathLab. You can attempt those homework exercises an unlimited number of times. Homework exercises help you to master the concepts and prepare you to take the quizzes. Students are allowed to get help on these exercises.
Students can re-take a quiz up to three times; the best score will be recorded. No make-up quiz given for any reason.

Tests
There will be four In-class Exams and Comprehensive Final Exam. Test and dates will be announced ahead of time. Problems on tests will be similar to either the suggested exercises or problems covered in course lectures. All four tests are comprehensive. Exams must be taken during the regular class time and no make-up exams will be given. The lowest exam grade will be dropped.

Tentative Test Schedule/Assignment(s) Schedule:

Assignment:	Tentative Date:
Test 1	
Test 2	
Test 3	
Test 4	
Final Exam	

Attendance/Participation: Attendance and participation are critical components toward your success in this course. You are expected to attend every class and to be active in the learning process. You are responsible for all material covered in class, regardless of whether or not you are present.
Attendance and participation will be worth 10 % of your grade. Throughout the term, you will be allowed 2 absences, excused or unexcused. Each additional absence will result in losing a point off the attendance portion of your final grade. Excessive lateness and/or leaving class early will also result in absences.
The grade for this course will be weighted based on the following categories:

Basis for Evaluating Student Performance: The grade for this course will be weighted based on the following categories:

Homework & Quizzes	**15%**
Attendance & Participation	**10%**
4 Exams	**50%**
Final Exam	**25%**
Total	**100%**

Accommodations Statement: Massasoit's Disability Services office provides accommodations to students who qualify for services based on a documented disability. Students interested in accessing classroom or testing accommodations must contact Disability Services directly. In an effort to avoid any lapse in services, new and returning students are encouraged to contact Disability Services at the beginning of each semester to receive an Accommodation Letter for the current semester. Students on all campuses can contact Disability Services at 508-588-9100 X 2132 or by e-mail at DisabilityServices@massasoit.edu for further information or questions.

Title IX Statement: Massasoit Community College is committed to providing a safe learning and work environment for all. If you believe you have experienced discrimination, sexual harassment, sexual assault, domestic/dating violence, stalking, or retaliation, we encourage you to report it to *Yolanda Dennis, Chief Diversity Officer and Title IX Coordinator, Office of Diversity and Inclusion, at 508-588-9100, x1309 or* ODI@massasoit.edu. While you may talk to a faculty member, understand that as a "responsible employee" of the College, the faculty member must report what you share to the College's Title IX Coordinator. On and off campus resources and interim measures are available to assist you. Information about both of these policies can be found at www.massasoit.edu/title-ix and www.massasoit.edu/eeo. We are here to support you.

Academic Integrity: Academic dishonesty will not be tolerated. In particular, the use of cellphones is prohibited during exams and any use will result, at a minimum, of a grade of 0 for the exam. Please see the following URL for more information on the college's policies on academic integrity:
http://www.massasoit.mass.edu/admin_depts/college_policies/acad_honesty.cfm

Tentative Class Schedule: The tentative class schedule is provided below.
Course Outcomes

Changes to the Syllabus: If circumstances dictate, any changes to the information given in this syllabus will be announced in class as expeditiously as possible. You are responsible for keeping updated on any announced changes.

Week/Dates	Scheduled Topical Coverage	Other Notes
Week 1	○ Course Introduction ○ 1.1 Systems of Linear Equations	
Week 2	○ 1.2 Row Reduction and Echelon Forms ○ 1.3 Vector Equations	
Week 3	○ 1.4 The Matrix Equation $A\mathbf{x}=\mathbf{b}$ ○ 1.5 Solution Sets of Linear Systems	
Week 4	○ 1.5 Solution Sets of Linear Systems ○ **Exam 1**	
Week 5	○ 1.6 Applications of Linear Systems ○ 1.7 Linear Independence	
Week 6	○ 1.8 Introduction to Linear Transformations ○ 1.9 The Matrix of a Linear Transformation	
Week 7	○ 2.1 Matrix Operations ○ 2.2 The Inverse of a Matrix	
Week 8	○ 2.3 Characterizations of Invertible Matrices ○ **Exam 2**	
Week 9	○ 3.1 Introduction to Determinants ○ 3.2 Properties of Determinants	
Week 10	○ 3.3 Cramer's Rule, Volume, and Linear Transformations ○ 4.1 Vector Spaces and Subspaces	
Week 11	○ 4.2 Null Spaces, Column Spaces, and Linear Transformations ○ **Exam 3**	
Week 12	○ 4.3 Linearly Independent Sets; Bases ○ 4.4 Coordinate Systems	
Week 13	○ 4.5 The Dimension of a Vector Space ○ 4.6 Rank	
Week 14	○ 5.1 Eigenvectors and Eigenvalues ○ **Exam 4**	
Week 15	○ 5.2 The Characteristic Equation ○ **Review for final**	
	○ **Final Exam Period**	