Math 203 – Linear Algebra – Fall 2019

Dates/Times MW 10:30-11:45
Location David King Jr Hall 1006
Textbook *Linear Algebra and its Applications*, 5th edition, Lay, Lay and McDonald.
Instructor Matt Holzer, Exploratory Hall 4458
Email mholzer@gmu.edu
Office Hours M 9:00-10:00, W 3:00-4:00, F 10:00-11:00 (others by appointment)
Course Description In this course we will cover Chapters 1, 2 (partially), 3(partially), 4 and 5 of the textbook. This includes the study of and solutions to systems of linear equations, vector and matrices, determinants, vector spaces and eigenvalues.
Prerequisites Grade of C or better in MATH 114.
Important Dates

Monday September 2nd: no class
Monday October 14th: no class (Columbus Day)
Tuesday October 15th: class meets at usual time
Wednesday Nov 27th: no class (Thanksgiving holiday)
Wednesday December 11th: Final Exam

Attendance Attendance is not an explicit requirement for this course, but as you see it is an implicit requirement.
Standards Based Grading This course will use standard (or mastery) based grading. In this system a grade will be assigned at the end of the semester that reflects how many of the desired learning outcomes that you have mastered. A list of these standards is provided below.

Approximately every other week students will have the opportunity to select which standards they wish to be tested on. To demonstrate mastery of the standard, the problem or problems must be solved correctly with clearly written explanations of each step. If this is accomplished, then the standard is marked as having been met. If the answer or reasoning in incorrect, then no mark is recorded and you are able to attempt the standard again at a later date. If significant understanding of the issue is demonstrated but the answer is incorrect, then the mark of "partial pass" will be granted. You can count one "partial pass" score towards your total of standards passed in the table below.
Synthesis Exam During the Final Exam period, students will be asked to demonstrate the knowledge that they have gained throughout the semester. This five question exam will be scored with one point for a correct answer, a half point for a partially correct answer and zero points for an incorrect answer.
Grades Grades will be assigned based upon how many standards are met through the term and performance on the Synthesis Exam.

Standards + Synthesis	Grade
19-20	A
18	A-
17	B+
16	B
15	B-
14	C+
12-13	C
8-11	D
less than 8	F

List of Standards

1. Systems of linear equations: be able to solve a system of linear equations using elementary row operations, reduction to row echelon form and back substitution. Notions of consistency, free variables and solution sets. (1.1-1.2)

2. Vectors and geometry of linear equations: Understand the geometric and algebraic properties of vectors (addition, subtraction, scalar multiplication) and be able to interpret a system of equations as a vector equation. Linear combinations and span. (1.3-1.4)

3. Solution sets of linear systems: be able to compute solutions of homogeneous and inhomogeneous equations and express them in parametric form (1.5).

4. Linear Independence: be able to determine if a set of vectors is linearly independent or dependent. (1.7)

5. Linear Transformations: understand what a linear transformation is (superposition principle) and be able to associate a matrix to a linear transformation. Reflections/ contractions/ shears/ projections. (1.8-1.9)

6. Determinants: be able to compute the determinant of a 2×2 or 3×3 matrix and understand the interpretation of this quantity. (3.1)

7. Vector Spaces and subspaces: vector space axioms and examples including the interpretation of polynomials as vectors. (4.1)

8. Null Space and Column Space: be able to compute in examples and understand how they relate to non-zero pivots and free variables. Be able to identify the kernel and range of a linear transformation (4.2)

9. Basis and Dimension: be able to extract a linearly independent basis from a set of vectors. Find basis for the null and column space of a matrix. (4.3)

10. Rank and Invertible Matrix Theorem (4.6).

11. Eigenvalues and eigenvectors: be able to compute eigenvalues and eigenvectors for example problems using the characteristic equation. (5.1-5.2)

12. Eigenvalues and eigenvectors: theory and qualitative features. (5.1-5.2)

13. Diagonalization: know the diagonalization theorem and be able to apply it to examples in order to factor a matrix (5.4)

14. Complex Eigenvalues: be able to compute complex eigenvalues and the PCP^{-1} decomposition of a matrix. (5.5)

15. Markov Processes: be able to write down the transition matrix for a Markov Process and compute the associated steady state.

Academic Integrity You are bound by the Mason Honor Code and its policies related to Academic Integrity. Violations will be taken seriously. The minimum sanction for a violation of the honor code is the requirement to retake all passed standards. The maximum sanction is a failing grade in the course.
Disability Services Students may be eligible for accommodations through the Office of Disability Services
Communication All email communication is to take place through your gmu email account.