MATH 203-004 **Linear Algebra** **Spring 2021**
W 5:55pm - 8:35pm, 3 credit hours, Synchronous GMU Online Class Meetings

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Instructor: Dr. Sam Ferguson

Email: sfergus@gmu.edu

Office Hours: R 5:00pm - 7:00pm, usually accessed via emailed Zoom link, subject to change

Text and Materials: *Pearson MyMathLab access and access code—to be purchased. You will need to access the MyLab system—it has the eText—accessible via our course Blackboard page.

*Linear Algebra and Its Applications, *Sixth Edition*, by Lay, Lay, and McDonald. Published by Pearson, 2021. The eText version is fine.

*See "Required Access to Pearson's MyLab," "Access to Pearson's MyLab," and "Required Technologies" on the last page of this syllabus for more info on access and tech requirements.

Course Description: This course introduces students to the basic objects of linear algebra. The prerequisite is a C or better in Math 114 or Math 116. We will cover the following topics:

- Systems of Linear Equations
- Linear Independence
- Linear Transformations
- Inverse of a Matrix
- Determinants
- Vector Spaces
- Eigenvalues
- Eigenvectors
- Orthogonalization
- Symmetric Matrices
- Selected Applications

Student Expectations:

- *Attendance.* Classes meet online, and you are expected to either attend or view videos corresponding to each class. If you attend, you are to attempt any in-class exercises.
- *Preparation.* You are expected to be prepared for class. The preparation includes reading and learning material from the textbook before the lectures, as well as doing homework afterward. You are to check your GMU email daily for course updates, as emails are official course communication. Check the Math 203-004 Blackboard page and your GMU email an extra time right before class, to look for announcements or changes.
- *Collaboration.* You may collaborate and help fellow students as you judge appropriate for any in-class exercises. However, keep in mind that graded homework and exams do not allow for collaboration. Exams are individual efforts and sharing information about them is prohibited. Ask if you're unsure whether collaboration is permitted on some item.

Exam Dates: **Midterm Exam** March 3, 8:35pm to March 5, 11:59pm, take-home, in MyLab
Final Exam April 28, 8:35pm to May 4, 11:59pm, take-home, in MyLab

Due Dates: Reading the relevant sections of the text is part of the homework assignments. We will use Pearson's MyLab for homework and exams, and Blackboard for the syllabus quiz.

Syllabus Quiz	Friday, January 29, before 11:59pm
Section 1.1 Homework	Monday, February 1, before 11:59pm
Section 1.2 Homework	Tuesday, February 2, before 11:59pm
Section 1.3 Homework	Friday, February 5, before 11:59pm
Section 1.4 Homework	Monday, February 8, before 11:59pm
Section 1.5 Homework	Tuesday, February 9, before 11:59pm
Section 1.7 Homework	Friday, February 12, before 11:59pm
Section 1.8 Homework	Monday, February 15, before 11:59pm
Section 1.9 Homework	Tuesday, February 16, before 11:59pm
Section 2.1 Homework	Friday, February 19, before 11:59pm
Section 2.2 Homework	Monday, February 22, before 11:59pm
Section 2.3 Homework	Tuesday, February 23, before 11:59pm
Section 2.4 Homework	Friday, February 26, before 11:59pm
Section 2.5 Homework	Monday, March 1, before 11:59pm
Section 3.1 Homework	Tuesday, March 2, before 11:59pm
Midterm Exam	Friday, March 5, before 11:59pm
Section 3.2 Homework	Monday, March 8, before 11:59pm
Section 3.3 Homework	Tuesday, March 9, before 11:59pm
Section 4.1 Homework	Friday, March 12, before 11:59pm
Section 4.2 Homework	Monday, March 15, before 11:59pm
Section 4.3 Homework	Tuesday, March 16, before 11:59pm
Section 4.4 Homework	Friday, March 19, before 11:59pm
Section 4.5 Homework	Monday, March 22, before 11:59pm
Section 4.6 Homework	Tuesday, March 23, before 11:59pm
Section 5.1 Homework	Friday, March 26, before 11:59pm
Section 5.2 Homework	Monday, March 29, before 11:59pm
Section 5.3 Homework	Tuesday, March 30, before 11:59pm
Section 5.4 Homework	Friday, April 2, before 11:59pm
Section 5.5 Homework	Monday, April 5, before 11:59pm
Section 5.6 Homework	Tuesday, April 6, before 11:59pm
Section 5.8 Homework	Friday, April 9, before 11:59pm
Section 5.9 Homework	Monday, April 12, before 11:59pm
Section 6.1 Homework	Tuesday, April 13, before 11:59pm
Section 6.2 Homework	Friday, April 16, before 11:59pm
Section 6.3 Homework	Monday, April 19, before 11:59pm
Section 6.4 Homework	Tuesday, April 20, before 11:59pm
Section 7.1 Homework	Friday, April 23, before 11:59pm
Section 7.2 Homework	Monday, April 26, before 11:59pm

Section 7.4 Homework	Tuesday, April 27, before 11:59pm
Section 10.1 Homework	Friday, April 30, before 11:59pm
Section 10.2 Homework	Monday, May 3, before 11:59pm
Final Exam	Tuesday, May 4, before 11:59pm

Grades: Your base grade for the course will be calculated based on a syllabus quiz, the homework for thirty-nine textbook sections, a midterm exam, and a final exam. The syllabus quiz and homework for textbook sections are 10 points each, for a total of 400 points. The midterm exam is 240 points. The final exam is 360 points. The sum of these points determines your grade according to the scale below.

A: 900 or above B: 800-**899.9** C: 700-**799.9** D: 600-**699.9** F: below 600

+ or – are rarely used, but may be attached to final letter grades at the discretion of the instructor.

Extra Credit: Before the above scale is used to determine your letter grade, any extra credit points you have earned will be added to your base grade. Extra credit points can be earned if extra credit assignments (In-Class Activities, Reading Quizzes, or similar) are announced in lecture or email and you submit them to Blackboard before their respective deadlines.

Lectures: Lectures will be held over Blackboard Collaborate Ultra and/or Zoom. There is always a small possibility that a lecture could be interrupted or canceled due to a technical failure or unexpected instructor illness. For that reason, I suggest checking your email in the event that such an occurrence appears likely, as GMU email is the official form of communication for the course. If GMU itself closes, then emergency closing info may be obtained by calling 703-993-1000.

Email Responses: Until around 5:00pm on each weekday I am often occupied by other responsibilities, so please keep that in mind when writing time-sensitive emails. I will generally take up to 24 hours to respond to emails, with weekends and holidays not counting toward the 24.

Registration difficulties: If you have difficulty registering for this course, contact Christine Amaya at **camaya@gmu.edu**.

Late assignments: No make-up exams or homework assignments will be given in this course. Late homework or exams turned in after their respective deadlines are generally not accepted unless announced otherwise in lecture or by email. In certain extenuating health or family emergency circumstances, an extension may be granted so that an exam or a homework assignment may be turned in a specified number of days late. Extensions on an assignment or exam must generally be requested eight or more hours before that assignment or exam's deadline.

Honor Code: Sharing information of any kind about exams is an Honor Code violation. Any violations will be referred to the Office of Academic Integrity. You are expected to follow the GMU Honor Code: see http://academicintegrity.gmu.edu/honorcode/ for more info.

Academic Accommodation of Disability: If you are a student with a disability and you need academic accommodations, you must tell me by February 2 and contact the Office of Disability Services at 703-993-2474. All academic accommodations must be arranged through that office. For more complete information on Disability Services, see "Disability Services" on the last page.

General Remarks: Please be considerate of other students. Turn off and/or silence cell phones before class if you can and keep outside noise at a minimum. Be respectful of other students. We all have different experiences with math. What is easy for one may be challenging for another. The following is a tentative schedule for the course:

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January 27, Class 1: Review for the Syllabus Quiz Sec. 1.1 Systems of Linear Equations Sec. 1.2 Row Reduction and Echelon Forms
February 3, Class 2: Sec. 1.3 Vector Equations Sec. 1.4 The Matrix Equation Ax = b Sec. 1.5 Solution Sets of Linear Systems
February 10, Class 3: Sec. 1.7 Linear Independence Sec. 1.8 Introduction to Linear Transformations Sec. 1.9 The Matrix of a Linear Transformation
February 17, Class 4: Sec. 2.1 Matrix Operations Sec. 2.2 The Inverse of a Matrix Sec. 2.3 Characterizations of Invertible Matrices
February 24, Class 5: Sec. 2.4 Partitioned Matrices Sec. 2.5 Matrix Factorizations Sec. 3.1 Introduction to Determinants
March 3, Class 6: Review for the Midterm Exam Sec. 3.2 Properties of Determinants Sec. 3.3 Cramer's Rule, Volume, and Linear Transformations
March 10, Class 7: Sec. 4.1 Vector Spaces and Subspaces Sec. 4.2 Null Spaces, Column Spaces, Row Spaces, and Linear Transformations Sec. 4.3 Linearly Independent Sets; Bases
March 17, Class 8: Sec. 4.4 Coordinate Systems Sec. 4.5 The Dimension of a Vector Space Sec. 4.6 Change of Basis
March 24, Class 9: Sec. 5.1 Eigenvectors and Eigenvalues Sec. 5.2 The Characteristic Equation Sec. 5.3 Diagonalization
March 31, Class 10: Sec. 5.4 Eigenvectors and Linear Transformations Sec. 5.5 Complex Eigenvalues Sec. 5.6 Discrete Dynamical Systems
April 7, Class 11: Sec. 5.8 Iterative Estimates for Eigenvalues Sec. 5.9 Applications to Markov Chains Sec. 6.1 Inner Product, Length, and Orthogonality
April 14, Class 12: Sec. 6.2 Orthogonal Sets Sec. 6.3 Orthogonal Projections Sec. 6.4 The Gram-Schmidt Process
April 21, Class 13: Sec. 7.1 Diagonalization of Symmetric Matrices Sec. 7.2 Quadratic Forms Sec. 7.4 The Singular Value Decomposition
April 28, Class 14: Review for the Final Exam Sec. 10.1 Introduction and Examples of Finite-State Markov Chains Sec. 10.2 The Steady-State Vector and Google's PageRank

Important Dates for the Spring 2021 Semester: The last day to add is Monday, February 1.
The last day to drop a course with a full tuition refund is Friday, February 12.
The last day to drop a course with a half tuition refund is Tuesday, February 16.
The last day to drop a course in the unrestricted withdrawal period is Monday, March 1.
The evaluation period for PatriotWeb midterm grades begins on Sunday, February 21.
The last day to drop a course in the selective withdrawal period is Thursday, April 1.
There will be no Spring Recess this semester.

Midterm Exam Coverage: The midterm exam will cover Sections 1.1 through 1.5, Sections 1.7 through 1.9, Sections 2.1 through 2.5, and Section 3.1 of the textbook.

Final Exam Coverage: The final exam will cover Sections 4.1 through 4.6, Sections 5.1 through 5.6, Sections 5.8 through 5.9, Sections 6.1 through 6.4, Sections 7.1 through 7.2, and Section 7.4 of the textbook.

Tutoring Center: The Math Tutoring Center at GMU is open online Monday through Thursday, 2pm to 7pm. If you are interested in using this resource, you must self-enroll. See **https://science.gmu.edu/academics/departments-units/mathematical-sciences/math-tutoring/tutoring-center-hours-and** for further information. If you have any other queries about the Math Tutoring Center, email Gabriela Bulancea at **gbulance@gmu.edu** with your questions.

Feedback: I am interested in hearing your feedback about the course, including both things you especially like and your suggestions for improvement. Information about how to provide feedback will be sent by email or posted as an announcement on Blackboard after midterms.

ITS Support Center: Trouble with technology related to this course should be addressed to the ITS Support Center. See **https://its.gmu.edu/service/its-support-center/** for more information. I suggest emailing the ITS Support Center at **support@gmu.edu** for help. You are generally responsible for making sure that you obtain and maintain your MyLab access, internet access, and access to course materials, so do not procrastinate on contacting the ITS Support Center right away if you have technical issues of any kind.

Disability Services: Disability Services at George Mason University is committed to providing equitable access to learning opportunities for all students by upholding the laws that ensure equal treatment of people with disabilities. If you are seeking accommodations for this class, please first visit http://ds.gmu.edu/ for detailed information about the Disability Services registration process. Then please discuss your approved accommodations with me. Disability Services is located in Student Union Building I (SUB I), Suite 2500. Phone: (703) 993-2474 Email: ods@gmu.edu

Counseling and Psychological Services: Counseling and Psychological Services are available for GMU students. See http://caps.gmu.edu or call 703-993-2380 for more info.

Student Support and Advocacy Center: SSAC provides guidance to students experiencing hardship or trauma, or otherwise encountering barriers to success. See https://ssac.gmu.edu/ or call 703-993-3686 for more info.

University Policies: The University Catalog at http://catalog.gmu.edu is the central resource for university policies affecting students, faculty and staff conduct in university academic affairs. For other policies, you are referred to the http://

universitypolicy.gmu.edu/ website. All members of the university community are responsible for knowing and following established policies. In particular, note that this Math 203 course is one of those courses which can generally be taken at most 3 times.

Required Access to Pearson's MyLab: You must purchase an access code to access MyMathLab and the eText version of our textbook. If you buy a used book, please be sure that you have an access code for Pearson's MyLab, as it is required for this course.

Access to Pearson's MyLab: You are referred to the Powerpoint presentation available at **https://pearsoncustomersuccess.co/ccb66** for help with access to Pearson's MyLab. If you need further support, visit **https://support.pearson.com/getsupport/s/** for help.

Required Technologies: You need regular and consistent access to a computer, connected to the internet, for this course. It is highly recommended that you have access to high speed internet to attend or watch lectures. This online course is taught via Blackboard. To get to our course, login to http://mymason.gmu.edu, select the Courses Tab, and Math 203 can be found in the Course List. You need access to your GMU email account. In order to ensure student privacy, I plan to only correspond with you via your GMU email. Any video lectures that are recorded will be posted in Recordings under the submenu that appears within the Lectures tab of our Blackboard page. You need to be able to access Blackboard to participate in this course.