South Plains College
Common Course Syllabus: Linear Algebra (MATH 2318)
Spring 2023

Department: Mathematics, Engineering, and Computer Science

Discipline: Mathematics

Course Number: MATH 2318

Section: 001 (Mondays and Wednesdays, 1:00-2:15pm, Mathematics-Engineering building, room 126)

Course Title: Linear Algebra

Available Formats: conventional/flex

Campuses: Levelland and Lubbock Downtown Center. This class meets face-to-face on the Levelland campus in the Mathematics-Engineering building, room 126.

Course Description: Introduces and provides models for application of the concepts of vector algebra. Topics include finite dimensional vector spaces and their geometric significance; representing and solving systems of linear equations using multiple methods, including Gaussian elimination and matrix inversion; matrices; determinants; linear transformations; quadratic forms; eigenvalues and eigenvector; and applications in science and engineering.

Prerequisite: Successful completion with a grade of 'C' or better in MATH 2414 (Calculus 2).

Credit: 3 **Lecture:** 3 **Lab:** 0

Instructor: Jay Driver
Telephone: (806) 716-2780
Office: Math and Engineering building, office 114
Email: The instructor may be emailed through Blackboard or at jdriver@southplainscollege.edu.

Email Policy: All students at South Plains College are assigned a standardized SPC e-mail account. Although personal email addresses will continue to be collected, the assigned SPC e-mail account will be used as the official channel of communication for South Plains College. The Student Correspondence Policy can be found at www.southplainscollege.edu. To access the SPC student e-mail account, log in to portal.office.com. (Copied from SPC Student Guide) Since all students have an assigned SPC email, the instructor will only acknowledge, respond, and send emails to your assigned SPC email. This ensures all correspondence from the instructor is received by the intended recipient.

Virtual/Face-to-Face Office Hours:
- Mondays, 10:45am-12:00pm.
- Tuesdays, 10:45-11:30am, 2:30-3:30pm.
- Wednesdays, 10:45am-12:00pm.
- Thursdays, 10:45-11:30am, 2:30-3:30pm.
- Fridays, 8:30-9:30am, 10:45-11:45am.
- And by appointment, as needed. (The appointments can be scheduled in Blackboard.)

Virtual office hours also may be scheduled in Blackboard.

Textbook: A textbook is not required; however, textbook references for this course may be any of the following:
- Larson, R. (2017). Elementary Linear Algebra, Eighth ed. Boston, MA: Cengage Learning. ISBN 978-1-305-65800-4.

- Larson, R. (2013). <u>Elementary Linear Algebra, Seventh ed.</u> Boston, MA: Brooks/Cole. ISBN 978-1-133-11087-3.
- Larson, R. & Falvo, D. C. (2009). <u>Elementary Linear Algebra, Sixth ed.</u> Boston, MA: Houghton Mifflin Company. ISBN 0-618-78376-8.
- Larson, R., Edwards, B. H. & Falvo, D. C. (2004). <u>Elementary Linear Algebra, Fifth ed.</u> Boston, MA: Houghton Mifflin Company. ISBN 0-618-33567-6.

Supplies: You will need a calculator capable of matrix algebra (a TI-graphing calculator such as the TI-84 works well) and a minimal supply of graph paper. A TI-89 calculator is acceptable. Calculators on cell phones or other electronic devices are strongly discouraged and will <u>not</u> be allowed during testing without permission. Make certain you have access to a scanner or scanning app. <u>Gradescope is the recommended app.</u> Other apps such as CamScanner, Scannable, OneDrive, etc. are helpful in order to scan your assignments/quizzes and submit them through Blackboard, but the Gradescope app is the recommended app for this class.

Blackboard: Blackboard is the online course management system that will be utilized for this course. This course is supplemented online, so all access to course information and your instructor is through the Internet. This course syllabus, as well as <u>all</u> course materials can be accessed through Blackboard. Login at https://southplainscollege.blackboard.com/. The user name and password should be the same as the MySPC and SPC email.

        User name: first initial, last name, and last 4 digits of the Student ID
        Password: Original CampusConnect Pin No. (found on SPC acceptance letter)

Questions regarding Blackboard support may be emailed to blackboard@southplainscollege.edu or by telephone to 806-716-2180.

This course partially satisfies a Core Curriculum Requirement: None

Core Curriculum Objectives addressed:
- **Communications skills**—to include effective written, oral and visual communication
- **Critical thinking skills**—to include creative thinking, innovation, inquiry, and analysis, evaluation and synthesis of information
- **Empirical and quantitative competency skills**—to manipulate and analyze numerical data or observable facts resulting in informed conclusions

Student Learning Outcomes: Upon completion of this course and receiving a passing grade, the student will be able to:

1. Be able to solve systems of linear equations using multiple methods, including Gaussian elimination and matrix inversion.
2. Be able to carry out matrix operations, including inverses and determinants.
3. Demonstrate understanding of the concepts of vector space and subspace.
4. Demonstrate understanding of linear independence, span, and basis.
5. Be able to determine eigenvalues and eigenvectors and solve problems involving eigenvalues.
6. Apply principles of matrix algebra to linear transformations.
7. Demonstrate application of inner products and associated norms.

Student Learning Outcomes Assessment: Pre- and post-test questions (assignments, quizzes, and major exams) will be used to determine the extent of improvement that the students have gained during the semester.

Course Evaluation: There will be departmental final exam questions given by all instructors. Assignments, quizzes, and exam corrections will count for 20% of the final grade, while exams count for 80% of the final grade. Expect 19 assignments, approximately 10 quizzes, and 4 scheduled exams throughout the course. Your final average in the course will determine the letter grade posted on your transcript. This grade is determined by the following scale: A (90-100%), B (80-89%), C (70-79%), D (60-69%), F (0-59%).

Grading Policy: Assignments/Quizzes (19 assignments, approximately 10 quizzes, *Matlab assignments, exam corrections) = 20%

> Exam 1 (covering Assignments 1-4) = 15%
> Exam 2 (covering Assignments 5-8) = 20%
> Exam 3 (covering Assignments 9-14) = 20%
> Exam 4 (covering Assignments 15-19) = 25%.

Matlab use dependent upon availability through SPC.

Assignments and Exams List: The following is a sequential list of the assignments and exams.
1. Linear Systems
2. Gauss-Jordan Elimination
3. Applications of Linear Systems
4. Summations
   *MATLAB Assignment #1

Exam 1 (15%)
5. Matrix Operations
6. Special Matrices
7. Determinants
8. Applications of Determinants

Exam 2 (20%)
9. Vector Spaces
10. Linear Independence
11. Basis & Dimension
12. Rank
13. Change of Basis
14. Vectors

Exam 3 (20%)
15. Linear Transformations
16. Transition Matrices & Similarity
17. Eigenvalues and eigenvectors
18. Diagonalization
19. Applications of Eigenvalues
   *MATLAB Assignment #2

Exam 4 (25%)
Matlab use dependent upon availability through SPC.

Assignment Format and Policy: Assignments are given after each lesson and are collected according to the calendar below. For each question on each assignment:
- Write the question number.
- In solving the problem, show <u>all</u> necessary work.
- Clearly mark your answer.
- Check your answers through Blackboard to make certain you are practicing the exercises correctly.
- Write your name at the top of each page of your work.
- Submit the assignment in Blackboard as a single pdf file, preferably using the Gradescope app. (Pdf files can be generated easily using a scanner or many freely available phone apps, like CamScanner, Scannable, or OneDrive.)

Make certain to complete and submit assignments on time (or early). Early submissions are welcomed! Late assignments will be accepted with a 15% deduction up to the time of the unit exam. Assignments may not be submitted after the unit exam.

Quiz Format and Policy: Expect a face-to-face quiz to be administered at many class sessions. <u>No late quizzes will be accepted</u>, as quizzes are to be taken during the class time.

Exam Format and Policy: There are four (4) units of study in this course. At the conclusion of each unit is a face-to-face examination on specified Wednesdays, 1:00-2:15pm except for the final exam, which is on Wednesday, May 10, 10:15am-12:15pm.

Exam Corrections Format and Policy: After the first three exams are graded and returned, students will correct the exams, as needed. Each of these three corrections assignments will contribute to the assignment grades for the class. Sufficient time will be allowed for corrections. No late corrections assignments will be accepted.

To maximize your potential for successfully completing this course:
- login to Blackboard daily;
- watch the lecture videos and take notes on them;
- thoroughly complete and submit the assignments on time;
- practice the exercises repeatedly until you have full mastery of them.

Attendance/Student Engagement Policy: Attendance and engagement are the most critical activities for success in this course. The instructor maintains records of the student's attendance and submission of assignments throughout the semester. The student is expected to attend at least eighty percent (80%) of the total class meetings **and** submit at least eighty percent (80%) of the total class assignments to have the best chance of success. If the student fails to meet these minimum requirements, the instructor may remove the student from the class with an X, upon their discretion, to help the student from harming their GPA. If the student cannot receive an X, the instructor will assign an F.

- Before arriving for the class meeting, make certain you have
  1. worked through the notes and videos for that week's lessons;
  2. completed some of the assigned exercises.

- Upon arriving at the class meeting, we will
  1. answer questions over exercises;
  2. work through exercises;
  3. submit assignments and quizzes.

SPC Tutors
Tutoring is FREE for all currently enrolled students. Make an appointment or drop-in for help at any SPC location or online! Visit the link below to learn more about how to book an appointment, view the tutoring schedule, and view tutoring locations.
http://www.southplainscollege.edu/exploreprograms/artsandsciences/teacheredtutoring.php

Tutor.com
You also have 180 FREE minutes of tutoring with Tutor.com each week, and your hours reset every Monday morning. Log into Blackboard, click on the tools option from the left-hand menu bar. Click on the Tutor.com link and you will automatically be logged in for free tutoring. You may access tutor.com tutors during the following times:
> Monday – Thursday: 8pm-8am
> 6pm Friday – 8am Monday morning

For questions regarding tutoring, please email tutoring@southplainscollege.edu or call 806-716-2538.

Academic Integrity (Plagiarism and Cheating Policy): "Complete honesty is required of the student in the presentation of any and all phases of course work. This idea applies to quizzes of whatever length as well to final examinations, to daily reports, and to term papers" *(SPC General Catalog).*

Plagiarism violations include, but are not limited to, the following:
1. Turning in a paper that has been purchased, borrowed, or downloaded from another student, an online term paper site, or a mail order term paper mill;

2. Cutting and pasting together information from books, articles, other papers, or online sites without providing proper documentation;
3. Using direct quotations (three or more words) from a source without showing them to be direct quotations and citing them; or
4. Missing in-text citations.

Cheating violations include, but are not limited to, the following:
1. Obtaining an examination by stealing or collusion;
2. Discovering the content of an examination before it is given;
3. Using an unauthorized source of information (notes, textbook, text messaging, internet, apps) during an examination, quiz, or homework assignment;
4. Entering an office or building to obtain an unfair advantage;
5. Taking an examination for another;
6. Altering grade records;
7. Copying another's work during an examination or on a homework assignment;
8. Rewriting another student's work in peer editing so that the writing is no longer the original student's;
9. Taking pictures of a test, test answers, or someone else's paper.

It is the aim of the faculty of South Plains College to foster a spirit of complete honesty and a high standard of integrity. The attempt of any student to present as his or her own any work which he or she has not honestly performed is regarded by the faculty and administration as a most serious offense and renders the offender liable to serious consequences, possibly suspension. *(SPC General Catalog)*

Plagiarism and cheating are not tolerated in this course. Under the policies of South Plains College, punishment for cheating may include no credit (failing) on the assignment, quiz, exam, or the course.

Student Code of Conduct Policy: Any successful learning experience requires mutual respect on the part of the student and the instructor. Neither instructor nor student should be subject to others' behavior that is rude, disruptive, intimidating, aggressive, or demeaning**.** Student conduct that disrupts the learning process or is deemed disrespectful or threatening shall not be tolerated and may lead to disciplinary action and/or removal from

COVID Response: South Plains College policies, return to campus plan, and protocols regarding COVID-19 can be found here: COVID Response (southplainscollege.edu).

Diversity, disabilities, non-discrimination, Title IX Pregnancy Accommodations, Campus Concealed Carry: South Plains College policies concerning diversity, disabilities, non-discrimination, Title IX Pregnancy Accommodations, and Campus Concealed Carry Statements can be found here: Syllabus Statements (southplainscollege.edu)

SPC Bookstore Price Match Guarantee Policy: If you find a lower price on a textbook, the South Plains College bookstore will match that price. The difference will be given to the student on a bookstore gift certificate! The gift certificate can be spent on anything in the store.

If students have already purchased textbooks and then find a better price later, the South Plains College bookstore will price match through the first week of the semester. The student must have a copy of the receipt and the book has to be in stock at the competition at the time of the price match.

The South Plains College bookstore will happily price match BN.com & books on Amazon noted as *ships from and sold by Amazon.com*. Online marketplaces such as *Other Sellers* on Amazon, Amazon's Warehouse Deals, *fulfilled by* Amazon, BN.com Marketplace, and peer-to-peer pricing are not eligible. They will price match the exact textbook, in the same edition and format, including all accompanying materials, like workbooks and CDs.

A textbook is only eligible for price match if it is in stock on a competitor's website at time of the price match request. Additional membership discounts and offers cannot be applied to the student's refund.

Price matching is only available on in-store purchases.   Digital books, access codes sold via publisher sites, rentals and special orders are not eligible. Only one price match per title per customer is allowed.

Note: The instructor reserves the right to modify the course syllabus and policies, as well as notify students of any changes, at any point during the semester.

Tentative Course Calendar: Below is a calendar view of assignment and exam due dates and times.

Date (Mon-Fri)	Topic(s) to be discussed (assignment is included with each lesson)	Assignment and Quiz Due Dates • Assignments are due by <u>noon</u> on corresponding Thursdays. • Quizzes are due by the end of the class meeting.
Wk1: Jan 16 – 20 (Mon, Jan 16, is a holiday.)	Course Introduction Lsn1: Linear Systems (a review lesson from previous math courses) Lsn2: Gauss-Jordan Elimination	Assignments 1 and 2 (Attend class for quiz announcements.)
Wk2: Jan 23 – 27	Lsn3: Applications of Linear Systems Lsn4: Summations	Assignments 3 and 4 (Attend class for quiz announcements.)
Wk3: Jan 30 – Feb 3	Exam 1 (Wed, Feb 1) The exam will begin at 1:00pm and be due by 2:15pm.	
Wk4: Feb 6 – 10	Lsn5: Matrix Operations Lsn6: Special Matrices	Assignments 5 and 6 (Attend class for quiz announcements.) Exam 1 corrections are due by noon, Friday, Feb 10.
Wk5: Feb 13 – 17	Lsn7: Determinants Lsn8: Applications of Determinants	Assignments 7 and 8 (Attend class for quiz announcements.)
Wk6: Feb 20 – 24	Exam 2 (Wed, Feb 22) The exam will begin at 1:00pm and be due by 2:15pm.	
Wk7: Feb 27 – Mar 3	Lsn9: Vector Spaces	Assignment 9 (Attend class for quiz announcements.) Exam 2 corrections are due by noon, Friday, March 3.
Wk8: Mar 6 – 10	Lsn10: Linear Independence Lsn11: Basis & Dimension	Assignments 10 and 11 (Attend class for quiz announcements.)
Wk9: Mar 20 – 24	Lsn12: Rank Lsn13: Change of Basis	Assignments 12 and 13 (Attend class for quiz announcements.)
Wk10: Mar 27 – 31	Lsn14: Vectors	Assignment 14 (Attend class for quiz announcements.)
Wk11: Apr 3 – 7 (Fri, Apr 7, is a holiday.)	Exam 3 (Wed, Apr 5) The exam will begin at 1:00pm and be due by 2:15pm.	
Wk12: Apr 10 – 14 (Mon, Apr 10, registration opens for the next semester.)	Lsn15: Linear Transformations	Assignment 15 (Attend class for quiz announcements.) Exam 3 corrections are due by noon, Friday, April 14.
Wk13: Apr 17 – 21	Lsn16: Transition Matrices & Similarity Lsn17: Eigenvalues and Eigenvectors	Assignment 16 *Note: Assignment 17 will be completed and due next week.* (Attend class for quiz announcements.)
Wk14: Apr 24 – 28 (Thur, Apr 27, is the last day to drop a spring 2023 class at SPC.)	Lsn18: Diagonalization	Assignments 17 and 18 (Attend class for quiz announcements.)
Wk15: May 1 – 5	Lsn19: Applications of Eigenvalues	Assignment 19
Wk16: May 8 – 11 (Semester ends Thur, May 11.)	Exam 4 (Wednesday, May 10) This exam is the cumulative final exam that will be from 10:15am-12:15pm in room M126.	