MATH 254 Intro to Linear Algebra
CRN 60344 SUMMER 2021

Instructor: Dr. Mohamed Benbourenane

Class Meeting Times: This is an online Class. No meeting time.
Proctored
Office: Online Via ZOOM (see course website for more details)
Contact Information: by email at mbenboure@sdccd.edu
Office Hours Online Via ZOOM: by Appointments
Email: mbenbour@sdccd.edu (this is the best way to reach me)

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

Textbook: ***Linear Algebra and its Applications,*** **by David C. Lay, Steven R. Lay, Judi J. McDonald 6th edition. Pearson 2021.**

Note:

1. *Only Student Access Code is required. Paper copy of the textbook is optional.*
2. *Purchase the Student Access Code from San Diego City College Bookstore or from Pearson website. Please read the instructions posted on CANVAS on how to purchase your access code online from PEARSON website.*

CATALOG 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, theChange of Basis Theorem, eigenvalues, eigenvectors, the rank and nullity of matrices andintroduction 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 OUTCOMES:

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.

STUDENT LEARNING OUTCOMES:

1. Students will be able to orthogonally diagonalize a 3x3 symmetric matrix.
2. Students will be able to find bases for the three fundamental subspaces of a matrix(rowspace, colspace, and nullspace).

Class Attendance:

Attendance in online courses is based on your frequency and the duration of your logins. Students are expected to spend between 16 to 20 hours per week working on this course (including time reading the textbook, going over the video lectures and taking notes, working out examples, working out non-assigned problems, getting help via ZOOM from your instructor or a tutor, taking tests, etc…). Though there may be times when you might need to spend more or less hours per week, the course is built for you to spend on the average about 18 hours per week. It is imperative that to maximize your chances for success, that you make sure you have the time available to spend in this class. I report attendance on Mondays for the previous week. If I see that you have not met the attendance and/or the progress requirement, you will be warned. You may be dropped if you fall behind on attendance and/or **progress** in the course.

IMPORTANT:

Your MML student account does not allow you to see how many hours you have spent overall. My instructor account does show me your online activities. So, I can see when you are just idling, or whether you are working at any one of various required activities. If you do not hear from me throughout the summer session with regards to your time on task and progress in the class, that is because you are typically getting decent grades on your homework assignments and exams and meeting the attendance policy. If I see that you are not submitting your homework assignments or you are failing to submit sections because you are not logging in throughout the entire week, you will get a notice from me and you will be placed on probation status. If you fail to meet the attendance and/or progress requirements of the course, you will be dropped. Please be aware of this policy. For this class, just trying to log in a few times per week or mostly on weekends, WILL NOT work.

Attendance in this class also includes submitting homework, viewing all the videos and submitting every test on time. You can view the pace at which I am expecting you to work at, by going to the MyMathLab Calendar button in our MyMathLab course shell. The bottom line….. do not get behind, stay on task, and submit all your homework assignments and tests when they are due.

If this time requirement does not fit into your schedule, you are strongly recommended to take this course during another semester, when you will be able to spend the time required to learn the material.

Student Responsibilities for this Course:

1. **Taking Class Notes:**
   Make sure you do take notes when going over the lecture videos, reading the textbook, or working out assigned homework problems.
   a. Two important reasons why you need to do this:
      i. These notes will be allowed during the Proctored Tests (Final Exam)
      ii. From time to time, I may ask students to submit pdf files of parts of these notes (use an app like "Genius Scan" on your phone to scan the requested lecture notes and then submitting them on CANVAS)

2. **Discussion Boards**

It is your responsibility to participate in the student discussion board forums that are set up in our MyMathLab and CANVAS websites. Basically most of the work for this course will be performed and submitted through mymathlab.com but we will also be using Canvas for other activities, including discussion boards and communications with the whole class as well as individual students (read on a regular basis the announcement section of both platforms). You are expected to help each other via the threaded discussions in order to learn from each other.

I will monitor the forums and I will also participate in the discussions that you will post. Any email that I receive where I feel that the rest of the class can benefit, I will post on the appropriate discussion board. If your participation in the discussion forums is consistent throughout the semester, I will take this into account when I assign final grades. Please note that I log in Monday through Friday. I do not log in over the weekends, so if you have questions please post them by Friday at 3pm.

Extremely Important: In order to perform all the work online you must have access to a computer, or mobile device that is not your phone. You will need to get your computer ready to perform all the mathematics by installing the required plugins. You can get more information on how to do this in MyMathLab website. In order for you to avoid some of the frustration, make sure you are running an updated web browser. I strongly recommend that you have at least 4GB of RAM and a machine that runs at a speed higher than 1.5 GHz.

Homework Assignments, Tests, and the Proctored Final Exam:

You need to submit the homework assignments by the deadlines. The score of the questions not completed by the deadline will be reduced by 15% per day (see the "Course Schedule" below for more details). If an assignment is not submitted initially by its due date, it will be considered late and it will impact your progress and attendance.
The lowest four homework assignment scores will be dropped.

For this course please be sure that you check your emails, discussion forums, and the announcements on a very regular basis.

Throughout this summer session there will be **three (3)** tests (these are non-proctored online tests), and a **Proctored Final Exam**. The **Final Exam** will be proctored via **ZOOM**. For

more information, please see the file "Proctored Exams". This information will also be posted (and updated) on the course website. For now, just plan on the fact that your course requires for you to complete the Final Exam in an **online proctored** session. There will be two sessions scheduled on Thursday August 5th and Friday August 6th, times, will be announced by July 2nd . Students will select one of the two sessions to take the final exam.
In addition to a computer, students will need a second devices with a camera to complete the proctored final exam.

Each of the three online tests will be 60 minutes in length. See MyMathlab Calendar for the dates when the tests will be released and when they are due. For every test there is a corresponding pretest. You are STRONGLY encouraged to take the pretests as many times as you need to so that you can be well prepared to complete your tests. Furthermore, students will earn 1% of extra credit for each of the 3 pretests IF the pretest score is higher than 70%. If your score in the pretests is not higher than 70%, regardless of what your score is, you will not receive the extra credit. The good thing is that you can retake the pretests as many times as you wish.

This extra credit is only to be awarded by me at my discretion at the end of the semester when all the other assignments have been submitted and IF the score of the Proctored Final Exam is higher than 50%.

You will have 2 opportunities to submit each of your three tests, so that if you do not score well enough on your first try, you still have a second opportunity to improve. Only the highest score is used to calculate your grades. See "Course Schedule" for the material covered by each test. You will be able to drop your lowest test score out of the three (3) tests, but only if **ALL** the three test scores are higher than 45%. ***If you do not take a test and/or receive a score lower than a 45% on any test, you will NOT be able to drop any test.*** And your overall grade will include all three (3) tests. Thus, you need to submit ALL scheduled tests and they all need to have scores higher than 45% to be able to drop the lowest one.

You are allowed to review your tests (and your pretests) ONLY RIGHT AWAY after you submit them and before you navigate away from the tests. Please review your tests carefully for errors. In case you feel that the computer marked a correct answer wrong (for example, the computer may expect an answer in decimal form, but you answered it in fraction form) then I will review your test to see if it was graded correctly, but you are expected to inform me via the appropriate forum or email. I can access your test, check your work, then give you credit if you are correct.

Your three (3) online Tests count for 36% of the course grade (18% each since we will be dropping the lowest test score if you meet the conditions stated above).

Grading Policy:

Homework Assignments	30%
Tests	36%
Proctored Final Exam	25%
Bonus points	05%

GRADING SCALE:

88 – 100%	**A**
87 – 78%	**B**
77 – 68%	**C**
67 – 58%	**D**
< 58%	**F**

Student Responsibilities

Please read the section of the student catalog regarding student rights and responsibilities to familiarize with what is called Policy 3100. Pay close attention to the section regarding the "Code of Conduct". I strongly encourage class participation using the discussion forums, so try to participate in a manner from which everyone can benefit. By district policy only those that are officially enrolled in the course are allowed to take part in the class activities on the PEARSON course platform.

Academic Dishonesty

While I encourage you all to work and study together with your fellow classmates, and to actively participate in the online discussion board, all work you submit must be your own. Cheating and plagiarism are serious offenses and will be treated seriously. Any student that is found cheating and/or plagiarism will receive an F for the exam, or possibly for the course, and referral to the office of the Dean of Student Affairs.

Comments Regarding Online Mathematical Search Engines, Websites, and Mobile Apps

In recent semesters, with the increasing prevalence and availability of *online mathematical search engines* (e.g. symbolab, wolframalpha, photomath, etc.), it is starting to become easier to fall into the trap of *letting a computer system, website, or mobile app* ***do your work for you***. While I strongly discourage you from using any mathematical search engines or apps, I fully understand that the enforcement of a ban on such services will solely be by the end user, the student. If you find yourself accessing *online mathematical search engines* more and more often, you will ultimately become dependent on such devices, thereby defeating the purpose of the productive struggle and the nature of learning. This will ultimately lead to a lack of success in the course, especially when it comes to the midterm and final exam, during which no such resources might be allowed!

Important Deadlines:

Last Day to Add:	06/22/2021
Last Day to Drop:	06/22/2021
Last Day to Withdraw:	07/16/2021
Pass/No-Pass Deadline:	06/29/2021
Refund Deadline:	06/19/2021

Please be aware that if you remain in the roster after the withdrawal deadline you will receive an evaluative grade on your transcripts. So please understand that you are responsible for your enrollment and status in the course.

OFFICE OF DISABILITY SUPPORT PROGRAMS AND SERVICES (DSPS)

Students with verified disabilities who may need academic accommodations should contact their instructor as soon as possible at the e-mail address listed in the link at the top of this syllabus. In order to coordinate with the Disabled Student Programs and Services office (DSPS) to identify appropriate accommodations, click here

http://sdcity.edu/students/services/dsps/index.aspx

Canvas Resources:

Canvas technical support is available to students. If you are having a technical problem with Canvas please reach out for help using the Helpdesk contact information below:

- *Helpdesk website:* https://www.sdccd.edu/about/departments-and-offices/business-technology-services-division/it/help-desk-services/index.aspx

WHERE TO GET HELP

Do not get behind; seek help. There are several sources of help available to the student. These are:

1. Me, your instructor via the discussion board forums. I check the website daily except on weekends. Via email but bear in mind that I do not check email as regularly as the website.
2. Via ZOOM (see course website for more details).

3. Your classmates. Please use the different threaded discussions on the different discussion boards on the course website to post and answer questions. I will visit these discussion boards regularly. I will answer questions posted there (I intervene only after students have been given the opportunity to answer their classmates' questions). I will also post questions in these forums so that if you do respond, you will get duly noted that you are participating and this can translate into a better grade if you happen to be borderline. The more active you are online, the more you will learn from this class.

4. **Due to COVID-19 on campus tutorial will not be available. Please see the links below on how to get online help.** City College offers two on-campus centers for math tutoring:
   a. Math Center
      - Room L-208
      - CSID card required upon entry
      - URL: https://www.sdcity.edu/academics/academic-resources/mathcenter/index.aspx
   b. Tutorial/Learning Center (TLC)
      - Room L-205
      - URL: https://www.sdcity.edu/students/services/tlc/index.aspx

CHAPTERS COVERED:

Chapter 1	1.1, 1.2, 1.3, 1.4, 1.5, 1.7, 1.8, 1.9
Chapter 2	2.1, 2.2, 2.3, 2.4, 2.5, 2.8, 2.9
Chapter 3	3.1, 3.2, 3.3
Chapter 4	4.1, 4.2, 4.3, 4.4, 4.5, 4.6
Chapter 5	5.1, 5.2, 5.3, 5.4
Chapter 6	6.1, 6.2, 6.3, 6.4
Chapter 7	7.1

Course Schedule

Week	Sections that will be covered	Assignments Due Date	Sections covered by Exams
1	1.1, 1.2, 1.3, 1.4, 1.5	06/23	
2	1.7, 1.8, 1.9, 2.1, 2.2	06/29	
3	2.3, 2.4, 2.5, 2.8, 2.9	07/05	**Test#1**: Chapter 1
4	3.1, 3.2, 3.3, 4.1, 4.2	07/11	
5	4.3, 4.4, 4.5, 4.6	07/18	**Test#2**: Chapters 2 & 3
6	5.1, 5.2, 5.3, 5.4	07/25	**Test#2**: Chapters 4 & 5
7	6.1, 6.2, 6.3	08/01	
8	6.4, 7.1	08/03	**Proctored Final Exam***: 08/05 0r 08/06 Cumulative

Note:

1. **Penalty for completing homework assignments after the due date:** If a question in a homework assignment is completed after its due date, the final score for the question will be reduced by 15% per day after the deadline. Example: If a homework assignment consists of 10 questions and one of the questions is completed two (2) days after the deadline, then the question final score will be reduced by 30%. If the question receives 1 point, it will be reduced to by 30% to 0.7 points. The scores of all questions of the homework assignment that are completed by the deadline will not be reduced.
2. **Penalty for completing tests after the due dates:** If a test is completed after its due date, the final test score will be reduced by 10% per day after the deadline. Example: If the test is completed two (2) days after the deadline, then the test final score will be reduced by 20%. If the test final score is 85%, the test reduced score will be 85*(100-20)/100= 68%.
3. **The Bottom line:** Try your best to stay very close to the schedule above.

Office Hours Online Via ZOOM: by Appointment

Please email me at mbenbour@sdccd.edu to request an appointment (please make your request at least 48 hours in advance, I will do my best to accommodate students).
The Zoom link will be posted on MyMathlab and CANVAS under “Virtual Office Hours”.