MTH 317.001 – Spring 2020
Linear Algebra

Course Description
Matrices, systems of linear equations, linear vector spaces, functions from \( \mathbb{R}^n \) to \( \mathbb{R}^m \), determinants, eigenvalues and eigenvectors. Prerequisite: MTH 311 or 234 and consent of instructor. A more detailed course description is available online.

Course Prerequisites
MTH 311 or MTH 234 and consent of instructor

Course Time and Meeting Place
Room 213 Bush Mathematical Sciences, 10:00-10:50 Mondays, Wednesdays, and Fridays, January 15 – May 8, 2020

Instructor
- Dr. Jane H. Long, Ph.D., Associate Professor, Department of Mathematics and Statistics
- Office: Bush Mathematical Sciences 318
- TEL: (936) 468-1804
- Email: longjh@sfasu.edu *** preferred method of contact
- Office Hours: Anytime my door is open, by appointment or

<table>
<thead>
<tr>
<th>Day</th>
<th>Time</th>
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<tbody>
<tr>
<td>Monday</td>
<td>11:00am-12:00pm</td>
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<tr>
<td>Tuesday</td>
<td>11:00am-12:15pm</td>
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<tr>
<td>Wednesday</td>
<td>12:00-12:45pm</td>
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<tr>
<td>Thursday</td>
<td>11:00am-12:15pm</td>
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<tr>
<td>Friday</td>
<td>11:00am-12:00pm</td>
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Additional office hours by appointment. The instructor regularly takes appointments. Do not hesitate to request one.

Course Goals
- To learn, recognize, use, explain, and justify the main concepts of elementary linear algebra, especially linear systems of equations, matrices, span, linear independence, linear transformations, vector spaces, eigenvalues and eigenvectors, and decompositions of matrices
- To develop abstract thinking skills
- To learn to communicate mathematical ideas precisely

Learning Objectives
At the end of MTH 317, a student who has studied and learned the material should be able to:
- Solve linear systems of equations either explicitly or numerically.
- Demonstrate understanding of abstract vector spaces and inner product spaces.
- Demonstrate understanding of linear transformations and their importance to pure and applied science.
- Demonstrate understanding of the symbiotic relationship between linear operators and matrices.

Students graduating from SFASU with a B.S. Degree and a major in mathematics will display competency in the following areas:
- Concepts: Demonstrate comprehension of core mathematical concepts (notion of theorem, mathematical proof, logical argument)
- Skills: Execute mathematical procedures accurately, appropriately, and efficiently (calculus, algebra, routine, non-routine, applied)
- Logical Reasoning: Apply principles of logic to develop and analyze conjectures and proofs (quantifiers, breaking down mathematical statements, counterexamples)
- Problem Solving: Demonstrate competence in using various mathematical tools, including technology, to formulate, represent, and solve problems (calculus tools, algebra tools, applied tools, nonstandard problem solving)
- Communication: Demonstrate proficiency in communicating mathematics in a format appropriate to expected audiences.(written, visual, oral)

Textbooks
The required textbook for this course is a set of unpublished course notes by Dr. Nicholas Long, SFASU faculty. It is freely available and will be provided for download by the instructor.
Course Requirements

- **Three in-class exams**, dates to be determined. One exam must be completed with a passing score in order to earn a C or better in the class; this is the Computation Exam and covers computations related to solving systems of linear equations. The exam may be taken multiple times.
- **Final Exam** (lasting 2.5 hours), taken Monday, May 4, 10:45AM – 1:15PM
- **D2L access.** You will be required to access SFA’s Learning Management Software (at http://d2l.sfasu.edu) periodically for announcements and access to required course materials.
- **Access to mathematical typesetting software (optional).** You will be required to turn in weekly homework assignments, which may be neatly handwritten or typed using mathematical typesetting software. Free CoCalc (formerly Sage MathCloud) access, which you may have from previous classes at SFA, will suffice for this purpose. You may also use LaTeX, Overleaf, or similar software. The instructor will provide details.
- **Homework** from the text will be collected, daily and weekly (see below), and graded.
- **Daily homework.** Due in class each day unless otherwise indicated.
- **Weekly homework.** Due in D2L dropbox or hard copy each week. May be typed using mathematical software such as LaTeX.
- **Presentations.** Daily homework from text will be presented by students and discussed in class. These discussions are the main avenue for learning in this course. Presentations will be graded (see below for more information).
- **Exam corrections,** in which you rework any exam questions for which you lost credit. Errors should also be classified according to the instructor’s criteria. These assignments will be returned to you for editing until they are completely correct. Credit for this assignment will not be awarded until all errors are completely corrected. These assignments are classified as “homework” and will not alter exam grades.
- **Attendance and participation in class are expected.** Most of our class time will be spent in student presentations and large class discussions. Learning within this framework requires active participation.
- **Additional assignments** at the instructor’s discretion.
- **Late work will not be accepted.**
- **There is no extra credit.**
- **Initiative to seek help outside of class may be necessary in order to succeed in the course.**

Course Calendar (Tentative)  Exam dates are to be determined.

- Vector Spaces, 20%
- Linear Transformations and Matrices, 20%
- Elementary Matrix Operations and Systems of Equations, 15%
- Determinants, 5%
- Diagonalization, 10%
- Eigenvalues and eigenvectors, 15%
- Inner Product Spaces, 15%

Grading and Exams

The will be three 50 minute exams and a final exam. Your course grade will be determined as follows:

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<tr>
<th>Component</th>
<th>Date</th>
<th>Percentage</th>
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<tbody>
<tr>
<td>Homework</td>
<td>Daily homework, weekly homework, exam corrections, presentations, and all other work other than exams</td>
<td>40%</td>
</tr>
<tr>
<td>2 Exams</td>
<td>TBD</td>
<td>20% each</td>
</tr>
<tr>
<td>Computation Exam</td>
<td>TBD</td>
<td>Required to pass course</td>
</tr>
<tr>
<td>Final Exam</td>
<td>Monday, Monday, May 4, 10:45AM – 1:15PM</td>
<td>20%</td>
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Homework

Homework will also be assigned from the text and graded. Your homework score is based on your grades from daily homework, weekly homework, exam corrections, presentations and any other assignments that are not exams.

You may collaborate with other students in this class but the work you write up and turn in should be your own. Even if you work with a group of students, you should not turn in identical write-ups. Your work should be communicated in your own words.

In addition, you should not consult outside sources (internet, books, other professors, students not in our class, tutors, other human beings, etc.). The most important reason for this is that you rob yourself of a learning opportunity when you look outside of yourself for solutions. Moreover, it will be very apparent during presentations that you do not fully understand important mathematical ideas. In general, students who copy or mimic proofs are unable to transfer ideas to other situations, which becomes obvious on exams and in later courses.

If your work is too similar to that of other student(s), or to outside sources, you should be prepared to be asked to justify your work individually or you may not receive credit for an assignment. This is a tedious and frustrating process for both the instructor and the students, and if it becomes a pattern, the instructor may report the situation as academic dishonesty.

Grading for Daily Homework

Problems will be assigned to turn in each class day unless otherwise indicated. Bring a hard copy to class (may be handwritten). Each problem should be prepared on a separate sheet of paper, to allow flexibility as to what is turned in each day. Students will present these problems at the board during class. Based on the in-class discussion, you may annotate your work using special pens provided by the instructor. The work you completed before class is graded on a 0, √-, √, √+ basis; annotations are for your own benefit.

Grading for Weekly Homework

Each week, you must select two problems to turn in from a list of problems presented in class the previous week. Your work must be either neatly written or typed and turned in via D2L Dropbox. Sage MathCloud access will be sufficient to complete the typed work.

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<thead>
<tr>
<th>Score</th>
<th>Criteria</th>
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<tbody>
<tr>
<td>4</td>
<td>Completely correct, clearly written solution</td>
</tr>
<tr>
<td>3</td>
<td>Mostly correct, minor flaw in mathematical detail or writing</td>
</tr>
<tr>
<td>2</td>
<td>Partially correct, significant flaw(s) or gap(s) in mathematics or significant writing errors</td>
</tr>
<tr>
<td>1</td>
<td>Some progress toward a correct solution</td>
</tr>
<tr>
<td>0</td>
<td>Essentially no progress toward a correct solution</td>
</tr>
</tbody>
</table>

Any problems for which you earned a 1, 2 or 3 may be resubmitted. Your recorded score will be the average of the two grades earned.
Grading for Presentations

Daily homework problems will be presented and discussed in class. You should plan to present about once a week. Presentations are graded according to the following scheme:

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</thead>
<tbody>
<tr>
<td>4</td>
<td>Completely correct solution with clear presentation</td>
</tr>
<tr>
<td>3</td>
<td>Mostly correct, minor flaw(s) in mathematical detail or language</td>
</tr>
<tr>
<td>2</td>
<td>Partially correct, significant flaw(s) or gap(s)</td>
</tr>
<tr>
<td>1</td>
<td>Some progress toward a correct solution</td>
</tr>
<tr>
<td>0</td>
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</tr>
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</table>

The Classroom

- The format for this course will likely be different from your previous math classes. Most of the class time will be spent with students presenting problems completed before class. The class will discuss these problem presentations, and you may use pens provided by the instructor to annotate the work you prepared for class that day – these annotations are essentially your notes for the class. You should not expect that the instructor will lecture, or that you will have a clearly defined set of notes to copy from the board. Instead, you and your classmates will construct your own knowledge with the professor facilitating discussions and asking questions. Getting used to this format requires some time, so be patient with yourself.
- DO NOT use your cell phone in class. This especially includes texting. Phones should be set to silent mode and put away during class time. You may NOT use your cell phone as a clock or calculator on exams. You should know that I find cell phone usage during class to be extremely wasteful behavior.
- Acceptable Student Behavior

Classroom behavior should not interfere with the instructor’s ability to conduct the class or the ability of other students to learn from the instructional program (see the Student Conduct Code, policy D-34.1). Unacceptable or disruptive behavior will not be tolerated. Students who disrupt the learning environment may be asked to leave class and may be subject to judicial, academic or other penalties. This prohibition applies to all instructional forums, including electronic, classroom, labs, discussion groups, field trips, etc. The instructor shall have full discretion over what behavior is appropriate/inappropriate in the classroom. Students who do not attend class regularly or who perform poorly on class projects/exams may be referred to the Early Alert Program. This program provides students with recommendations for resources or other assistance that is available to help SFA students succeed.

Add/Drop Policy

The Add/Drop Policy can be found online.

Attendance Policy

- Regular attendance is expected and absolutely necessary for your learning in MTH 317.
- Exam make-ups must be approved beforehand with documentation of a valid university sanctioned excuse
- Late homework is not accepted
- Bring your university ID card to all exams
- Arrive on time (early) to class having done all required work for the day
- The university’s Attendance and Excused Absences Policy can be found online

Withheld Grades Semester Grades Policy (A-54)

Ordinarily, at the discretion of the instructor of record and with the approval of the academic chair/director, a grade of WH will be assigned only if the student cannot complete the course work because of unavoidable circumstances. Students must complete the work within one calendar year from the end of the semester in which they receive a WH, or the grade automatically becomes an F. If students register for the same course in future terms the WH will automatically become an F and will be counted as a repeated course for the purpose of computing the grade point average.

The circumstances precipitating the request must have occurred after the last day in which a student could withdraw from a course. Students requesting a WH must be passing the course with a minimum projected grade of C.
Students with Disabilities
To obtain disability related accommodations, alternate formats and/or auxiliary aids, students with disabilities must contact the Office of Disability Services (ODS), Human Services Building, and Room 325, 468-3004 / 468-1004 (TDD) as early as possible in the semester. Once verified, ODS will notify the course instructor and outline the accommodation and/or auxiliary aids to be provided. Failure to request services in a timely manner may delay your accommodations. For additional information, go online.

Acceptable Student Behavior
Classroom behavior should not interfere with the instructor's ability to conduct the class or the ability of other students to learn from the instructional program (see the Student Conduct Code, policy D-34.1). Unacceptable or disruptive behavior will not be tolerated. Students who disrupt the learning environment may be asked to leave class and may be subject to judicial, academic or other penalties. This prohibition applies to all instructional forums, including electronic, classroom, labs, discussion groups, field trips, etc. The instructor shall have full discretion over what behavior is appropriate/inappropriate in the classroom. Students who do not attend class regularly or who perform poorly on class projects/exams may be referred to the Early Alert Program. This program provides students with recommendations for resources or other assistance that is available to help SFA students succeed.

Please be respectful of your fellow students and your instructor. Cell phone use and texting are not allowed in class. Remember to turn your cell phone off or place it in quiet mode before entering the classroom.

Academic Integrity (A-9.1)
Academic integrity is a responsibility of all university faculty and students. Faculty members promote academic integrity in multiple ways including instruction on the components of academic honesty, as well as abiding by university policy on penalties for cheating and plagiarism.

Definition of Academic Dishonesty. Academic dishonesty includes both cheating and plagiarism. Cheating includes but is not limited to (1) using or attempting to use unauthorized materials to aid in achieving a better grade on a component of a class; (2) the falsification or invention of any information, including citations, on an assigned exercise; and/or (3) helping or attempting to help another in an act of cheating or plagiarism. Plagiarism is presenting the words or ideas of another person as if they were your own. Examples of plagiarism are (1) submitting an assignment as if it were one’s own work when, in fact, it is at least partly the work of another; (2) submitting a work that has been purchased or otherwise obtained from an Internet source or another source; and (3) incorporating the words or ideas of an author into one’s paper without giving the author due credit.

Any acts of academic dishonesty will be dealt with according to University policy. Penalties for academic dishonesty may result in a failing grade for the assignment, failing the course, or even dismissal from the university.

Please read the complete Academic Integrity Policy

“Two things are very important: teach joyfully and be strict, and because you want your student to learn the proper thing....”

• R. Sharath Jois