Math 237
Linear Algebra

Course information:	Math 237 – Linear Algebra Spring 2021 Course format: Web-enhanced	**Instructor:**	Dr. Drew Lewis drewlewis@southalabama.edu (251) 219-8163
Meeting times:	(101) MWF 9:05-9:55 (102) MWF 11:15-12:05	**Office hours:**	By appointment

Student Success

I am committed to helping each and every one of you achieve your goals. I fundamentally believe that **everyone is a math person** and is capable of succeeding in this course. If there is something we could do differently that will help you succeed, please come talk to me.

There are many services on campus to help you succeed. I enthusiastically support the mission of our Office of Student Disability Services; if you are registered with them, please come speak to me in office hours so I can ensure I am doing everything needed to enable your success.

Basic Needs Security

Any student who has difficulty affording groceries or accessing sufficient food to eat every day, or who lacks a safe and stable place to live, and believes this may affect their performance in the course, is urged to contact the Dean of Students for support. Furthermore, please notify the professor if you are comfortable in doing so. This will enable me to try and provide information on accessing additional resources. Information on the campus food pantry is available at `https://southalabama.edu/departments/sga/foodpantry.html`.

Course Format

Due to the ongoing pandemic, we will not meet in person. **Class sessions will take place via Zoom at the regularly scheduled times**. Links to the Zoom sessions will be available in Canvas. By meeting virtually, you will be able to collaborate with a group of classmates on our in-class activities in a way that would be impossible in a socially distanced classroom.

This class is taught by a method called **team-based learning**. You will be assigned to a team that you will work with on various activities in class each day. The course is divided into **5 modules**.

- Before each module begins, **you will be responsible for ensuring your own readiness for the module**. A list of learning outcomes for the readiness assurance process is available in Canvas; you should be able to do each of these things before coming to class on the first day of the module. Some of these readiness assurance outcames are new material, some of these readiness assurance outcomes are topics from previous classes, and some are topics from earlier in this class. Along with these outcomes in Canvas are some preparation resources (videos or reading material) to help you prepare.

- The first day of each module will be dedicated to the **Readiness Assurance Process**. The dates for these are located in the course calendar.

  On these days, you will first take an **Individual Readiness Assurance Check**. After submitting this, working with your teammates you will retake the same problems as the **Team Readiness Assurance Check**. These are designed to measure if you are prepared for the team activities on subsequent days.

- On the other class days, you will work with your teammates on a series of activities designed to guide you through discovering the course material.

  You will also receive written feedback given by your peers on these surveys (in an anonymized form), to help you maximize your future contributions to the team.

How To Be Successful in This Course

Students who have been successful in this course in the past have told me that the following things were key to their success:

- **Attend every class meeting**. Obviously, this will sometimes not be possible, but make it a priority. Most students say that most of their learning takes place when they are working the class activities with their teammates.
- **Work homework problems**. Just like your favorite sport, you do not learn mathematics by watching someone else do it, but by doing it yourself. You need to work practice problems to learn. Resist the temptation to just watch videos or review your notes.
- **Use your teammates and classmates as a resource**. Ask questions on Canvas. Ask your teammates questions during class. We are here to help each other learn.
- **Reassess early and often**. The grading system in this class offers you lots of flexibility. Don't wait until the end of the semester to try and demonstrate mastery of everything.
- **Complete a self assessment and participate in the weekly discussion each week**. The self assessments are designed to help you make sure you are progressing towards the grade you want. The weekly discussions will not usually apply directly to our content, but rather help us think about mathematics and our course material a little more broadly. Some of them are also just to help us get to know each other a little better.

Communication Plan

- Questions about the content or the course that apply to the entire class should be posted in Canvas. This way, I can post an answer that everyone can see, helping everyone get the information they need faster. If you email me such a question, I will ask you to post it in the Canvas; this is not because I don't want to answer it, but because I think answering it publicly will be helpful to everyone.
- For questions that pertain to you specifically or your progress in the course, the best way to reach me is by email at `drewlewis@southalabama.edu`. I generally respond to emails within one working day. Do not expect a reply to an email sent outside of business hours until the next day.
- Additionally, you can text or call me at `(251) 219-8163`. This is my cell phone, not an office number.

Office Hours and Instructor Availability

Office hours are times I have specifically set aside to be available for you to drop-in to ask questions, attempt reassessments, or talk with me about anything else. They would probably be better named **Student Hours**. Because of social distancing requirments, all office hours will be done virtually and by appointment; **send me an email to schedule a time**. The Zoom link for office hours is posted in Canvas.

Disaster Plan

In the event of a campus closure (e.g. due to a pandemic or weather), we will continue to meet virtually via Zoom at our regular time as best we can. Any changes to our plans will be communicated by email and/or CanvasAnnouncement. In such an event, I ask that we all extend grace and patience to each other; we will all do the best we can in the circumstances.

Instructional Tools

We will use the following tools in this course.

- We will use **Zoom**, particularly the **Zoom breakout groups**, for class meetings. The links to these can be found in Canvas.

- We will use **Google Jamboards** to collaborate during class time. A link to the Jamboard for each class day will be posted in Canvas.
- Homework problems will be available through a website called **CheckIt** developed by my colleague Dr. Clontz. A link can be found in Canvas.
- We will make use of **Discussion boards** in Canvas.
- Assessments (e.g. quizzes and exams) will be submitted through Canvasas well.

Course Description

This course provides an introduction to linear algebra. Topics include systems of linear equations, matrices, Gaussian elimination, rank, linear independence, subspaces, basis, dimension, linear transformations, determinants, eigenvalues and eigenvectors, change of basis, diagonalization, the abstract concept of a vector space, and applications. Core Course.

Learning Outcomes

At the completion of this course, each student will be able to...

1) Work collaboratively on difficult mathematics problems
2) Solve systems of linear equations.
3) Determine whether or not a set with given operations is a vector space or a subspace of another vector space.
4) Determine properties of sets of vectors such as whether they are linearly independent, whether they span, and whether they are a basis of a given subspace.
5) Perform fundamental operations in the algebra of matrices, including multiplying and inverting matrices.
6) Use and apply algebraic properties of a linear transformation.
7) Determine geometric information about a linear transformation, including computing determinants, eigenvalues, and eigenvectors.

General Education Learning Outcomes

This course addresses the following university-wide learning outcomes in quantitative reasoning:

1) Students will evaluate information presented in mathematical forms (e.g., equations, graphs, diagrams, tables, words).
2) Students will convert relevant information into various mathematical forms (e.g., equations, graphs, diagrams, tables, words)

Topics

We will cover the topics outlined on the **Course Standards** sheet provided to you, in the order that they appear on that sheet. These topics are taken from the first seven chapters of the textbook, but are arranged in a more logical order.

Textbook

This course will follow the activities at `https://teambasedinquirylearning.github.io/linear-algebra/`. Most students find that this is the only text they need.

If you prefer an expensive book from a major publisher, the bookstore will be happy to sell you "Elementary Linear Algebra with Applications" by Kolman and Hill. A free alternative is "Linear Algebra" by Hefferon, available at `http://joshua.smcvt.edu/linearalgebra/book.pdf`. We will not directly use either of these, but feel free to use them as an extra reference.

Attendance Policy

Attendance is required to be successful in this course, and will be tracked each day. "Perfect" attendance is considered anything greater than 80% to allow for a small number of short term absences for any reason. If you find yourself missing more class than this, come talk to me.

Standards Based Grading

This course is graded by a methodology called **standards based grading**. Instead of receiving one percentage grade for an assessment, you will be assessed on whether or not you demonstrated excellence on individual **learning standards**. A list of these 24 standards is available in Canvas. Your grade in the course will be based on how many of these standards you demonstrate excellence on. **On each standard, you will demonstrate excellence on two separate ocassions**.

Feedback

On a written assessment, you will not receive a score or a percentage. For each standard on that assessment, you will be scored into one of three categories.

- **Demonstrated Excellence**: You successfully demonstrated **Excellence** of that standard. Great job! Check off another box on your progress sheet.
- **Minor Revision Needed**: You have a minor mistake, unrelated to the standard being assessed. These usually fall into two main categories: arithmetic mistakes, and poor presentation (which are both usually symptoms of artificial time constraints rather than a lack of content mastery). You should **write out a complete solution** to the problem and resubmit the assessment in Canvas (you can leave the other questions blank). **You must do this within a week of the original assessment**.
- **Reassesment Needed**: You'll need to work a new problem. See 'Reassessment' below for options.

You can track your progress through the 'Learning Mastery' part of the gradebook in Canvas.

Reassessment

You will have multiple opportunities to demonstrate mastery of each standard.

1) Each week we will have either a short assessment ("quiz"), covering up to 4 standards, or a long assessment ("exam"), covering all of the standards discussed so far. **A detailed schedule listing exactly which day each standard appears on quizzes is posted in Canvas.**

2) Additionally, if you receive a "Reassessment needed" on a standard, you can work an on-demand reassessment through Canvas. There are a few caveats to on-demand reassessments:

   - In order to reassess a single standard, you must have completed additional practice problems. Submit these through the 'Reassessment Request' link
   - Once you have done this, I will take a quick look at your practice problems; if there are no issues, I will assign a one question reassessment in Canvas.
   - Note that there will be a small lag, as I want to look at your reassessment request and manually approve it. I'll try to do this each day, though if many people submit these (especially towards the end of the semester) I will only do this as fast as I can grade the reassessments.

Assessments

There will be two kinds of in class assessments:

- As mentioned above, at the end of most weeks will be either a quiz or exam; barring unforseen events (e.g. weather days) there will be 8 quizzes and 4 exams. The dates for each, including which standards will appear on which quizzes, is available in the Course Calendar in Canvas.
- The Final Exam will be completed asynchronously, and must be completed by Wednesday, May 5.

Calculator Policy

Calculators of any sort may be used on exams provided that the calculator cannot make phone calls, send text messages, access the internet, or otherwise communicate with other devices. A calculator that can perform row reduction of large matrices is highly recommended.

Missed Classes, Exams and Coursework

As mentioned above, infrequent absence (e.g. due to intermittent illness) will not affect your course grade. However, it is generally considered polite to send your instructor a short email when you know you will miss class.

Weekly assignments and Readiness Assurance Checks will not be made up.

The above applies to the typical case of infrequent, intermittent absences. Should you have to be absent for an extended period of time for any reason, please come discuss with me as soon as possible so we can make alternate arrangements.

Grading

At the end of the semester, your grade will be computed in the following manner.

To earn a ...	... you should
A	Demonstrate excellence (twice) on 22 standards;
B	Demonstrate excellence (twice) on 20 standards;
C	Demonstrate excellence (twice) on 17 standards;
D	Demonstrate excellence (twice) on 15 standards;
F	Not fit in the above categories.

Homework

The only way to learn mathematics is to do mathematics; thus, our class time is centered around students doing mathematics. Additionally, you will require practice outside of class; a list of suggested exercises corresponding to each standard is available in Canvas. Your textbook also contains many more exercises.

I will neither collect nor grade homework, as past experience has not shown this to be a good use of instructor or student time. Instead, you should work as many problems as you need to. If you need feedback on your homework problems, bring them to my office hours and I will be happy to discuss them with you.

Student Academic Conduct Policy

All students are expected to adhere to the Student Academic Conduct Policy, which you can view at `http://www.southalabama.edu/bulletin/current/student-affairs/conduct.html`. Students violating this policy will be given one or more of the following penalties based on the severity of the offense: 1) Loss of all mastery marks on all standards affected by the misconduct; 2) Reduction in final course grade by a letter grade; 3) Automatic course failure.

Syllabus Changes

While I try hard to stick to the plans laid out here, this syllabus is subject to change (due to pandemics, weather events like hurricanes, etc.). Any changes made will reflect the spirit of this original syllabus, and will be updated on Canvas.