MAT 343: Linear Algebra

Fall 2026

Instructor:	Jared McBride	**Time:**	MWF 10:00 – 10:50 AM
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"We could compare learning to . . . the way a pianist prepares for a concert. A pianist cannot cram his knowledge of music and his playing skill into one week or even one month of solid practice to prepare for a concert. But he prepares himself through consistent diligent practice, day by day over a long period of time."

—Joseph B. Wirthlin
(*Finding Peace in Our Lives*, p. 75)

Information for all my students

Student Hours: Student hours are like office hours but they are not in my office. They are held, instead, right next door in the Magnolia Hall conference room (Magnolia Hall 109). They are at these times:

Tuesday and Thursday from 12:00 PM to 4:00 PM.

or by appointment. If you can't make student hours physically but can drop in on Zoom, please let me know before hand. The Zoom link will be https://zoom.us/my/drmcbsvu. Please, feel free to drop in with your questions. No appointment is necessary.

If you have a private matter to discuss, please make an appointment to see me. If it is quick (these things usually are) feel free to come to student hours and we can step into my office.

My tentative weekly schedule is as follows:

Time	Monday	Tuesday	Wednesday	Thursday	Friday
8:00 AM	MAT 305		MAT305		MAT305
9:00 AM	MAT 100	MAT221	MAT100	MAT221	MAT100
10:00 AM	MAT 343	MAT221	MAT343	MAT221	MAT343
11:00 AM	MAT 221		MAT221		Forum
12:00 PM	MAT 221	Student Hours	MAT221	Student Hours	
1:00 PM		Student Hours		Student Hours	
2:00 PM		Student Hours		Student Hours	
3:00 PM		Student Hours	Faculty Meeting	Student Hours	
4:00 PM			Faculty Meeting		

AI Use Policy: The purpose of this course is to help you develop both skills and deep understanding, especially of mathematical concepts. Homework and assignments are designed to give you the practice you need to build those skills.

Some students may be tempted to use AI tools to complete their work instead of working through problems themselves. This is like signing up for a weight training class but using a machine to do the lifting for you; you wouldn't build the strength you need. The same is true here: if AI does the work, you miss the chance to develop the understanding and skills necessary for success in this course and in future courses.

That said, AI can be a helpful learning aid when used appropriately. Think of it like using a box to assist with pull-ups: you can use the box to help you get above the bar, then slowly lower yourself to build strength. After a while, you'll be able to do pull-ups without the box. Similarly, you can use AI to help you get "unstuck" on a problem—by asking for hints, clarifications, or explanations of a concept, rather than simply asking for the full answer. This is using AI to facilitate your learning rather than rob you of the chance to learn. This is what I referr to as using AI wisely.

Illustrative examples:

- **Wise use:** You are working on the homework and there is a question that you have already worked on but you keep getting it wrong, even after going to your notes and checking your method. You ask ChatGPT the question and observe what it did differently, You try it again and get it right with that modification. You make a note of that in your notes so you get it right next time. Or you make a note to ask about it in class.
- **Unwise use:** You have not yet attempted a certain homwork question but becaue you are low on time you copy the question and ask ChatGPT. Only some of the explincation makes sence or seems familiar to you, but you submitt it anyway. This is dishonest and not acceptable.

In this course, the policy for AI use is to use it wisely, which often means not using it at all. The unwise use of AI is prohibited and results in a loss of points and in some cases may be reported to the Provost office as a breach of academic integrity. Also, the use of AI on any quiz or test of any kind is prohibited, and if discovered will result in a zero on that quiz or test. If you are unsure about whether your use of AI is wise or unwise, please ask me before you submit your work.

If you rely on AI to do the work for you, you may finish assignments faster, but it is unlikely that you will develop the skills you need to succeed.

One more thing, the wise use of AI is likely to be extremely important in your career. Start now learning how to get the full benefit of AI usage without compromising your own DEVELOPMENT.

Policies Specific to MAT 343: Linear Algebra

Since this is a major course, I feel it is important to give students ample opportunities and resources to develop their skills as independent learners. In my experience, one characteristic that sets math majors apart from other students is their ability to assimilate complex procedures and concepts in a short period of time. For better or worse, this ability is universally expected of math majors in both industry and academia. This is often referred to as a soft skill in graduate school, or as part of what is called the "hidden curriculum." My hope is that all of my students are well practiced in this skill by the time they graduate—so that they are not only capable of learning something on their own, but can do so effectively.

The way I attempt to foster this skill is by asking students to read the textbook before class. We then work through the section together during class time. Throughout this process, you will have ample opportunity to ask questions and—most importantly, in my opinion—to **discuss**, in your own words, what is happening. In doing so, we leverage the significant benefit of having a very small class size while we still have it. Each of you will have the opportunity to test and develop your understanding of the material through discussion with your peers and with me.

Textbook: We will be using *Linear Algebra and Its Applications*, 5^{th} Edition, by David C. Lay, Steven R. Lay, and Judi J. McDonald. The book is available online and is free.

Course Description: Includes vectors, dot and cross products, matrices, systems of equations, vector spaces, determinants, linear transformations, eigenvalues, and eigenvectors.

Prerequisite: (or concurrent enrollment) MAT 241 or consent of instructor.

Grading Scheme:

Pre-Reading Guides	10%
Lesson Quizzes	10%
Math The World Assignments	5%
Toughloves	5%
Homework	15%
Projects	10%
3 Midterm Celebrations of Knowledge (10% each)	30%
Final	15%
Total	100%

(The percentages guarantee at least the following letter grades.)

A	93%	C+	77%
A-	90%	C	73%
B+	87%	C-	70%
B	83%	D+	67%
B-	80%	D	63%

Pre-Reading Guides (10%): For each section we cover, there will be a lesson guide in PDF format. You should either download this guide and share it to Notability or print it out. Then, read the corresponding section of the textbook while filling out the first part of the lesson guide (stop at the In Class Notes). As you read, make note of any concepts or examples you do not understand. In general, you should read each section more than once to build familiarity with the material.

The guide exists to teach you *technical academic reading* — how to slow down, ask a mathematical text the right questions, and notice the moment you have lost the thread. That is a skill, and like any skill it is trained by working at the edge of what you find hard. The quiz that goes with it is the other half of the picture: it gauges how well you actually absorbed the material.

Because the point is the training and not the paperwork, **you need only complete half of a reading guide to receive full credit on it.** Which half is up to you — and I want you to choose deliberately. **Do the parts you expect to find hard.** If an item is easy and you would gain nothing from writing it out, skip it, up to half the guide. Choose your half by what will teach you something, not by what is quickest.

Since AI tools are now widely available, you are welcome to keep one handy while reading, so you can ask questions if something is unclear. Ideally, I will review each reading guide before we meet in class. If you have specific questions, please write them directly in the reading guide in red, so I can address them either in class or in your graded reading guide. Completed guides should be uploaded to the appropriate Canvas assignment before class.

Earning your way out of the guides. The reading guides are training wheels. Their whole purpose is to build a habit you will eventually not need. So if you show me the habit has taken, you may ride without them: **score above 85% on a unit's Celebration of Knowledge and you are excused from the pre-reading guides for the next unit.**

Score above 85% on...	**...and you are excused from the guides for**
Celebration 1 (Chapters 1 & 2)	Chapters 3 & 4
Celebration 2 (Chapters 3 & 4)	Chapters 5 & 6
Celebration 3 (Chapters 5 & 6)	Chapter 7

Two things this does *not* mean. **You are not excused from the reading.** You still read every section, and the **Lesson Quizzes are still required every time** — they are how both of us check that the reading happened. And the exemption is earned one unit at a time: each Celebration grants it only for the unit that follows.

One piece of timing to watch. The next unit begins before I can grade a Celebration, so the first guide or two of that unit will come due before you know whether you earned the exemption. **Do not gamble.** Keep submitting until I tell you that you are excused; anything you turned in that the exemption ends up covering will be excused retroactively, so you lose nothing by handing it in. If you skip a guide and then land below the cut, that one is simply a zero.

Lesson Quizzes (10%): Along with each pre-reading guide there is a short Lesson Quiz on Canvas covering that section's reading. Its purpose is not to trick you; it is to let both of us see, before class starts, whether the main ideas of the reading landed. Each quiz is **10 multiple-choice questions**, and should be pretty straightforward if you have read the section and understood it.

Each Lesson Quiz is due before the class meeting in which we cover that section, at the same time as the pre-reading guide. Take the quiz *after* you have done the reading and filled out your guide — taking it first defeats the purpose and generally goes badly. Answers are released once the quiz is past due, so you can see what you missed and, if you think a question is keyed incorrectly, tell me. **Late quizzes are not accepted, but I drop your two lowest quiz scores.**

Math The World Assignments (5%): The YouTube channel *Math The World* has an excellent playlist, *Linear Algebra in Context*, that answers the "when will I ever use this?" question for most of the big ideas in this course. You will be given a video guide listing every video in the playlist, matched to the sections of our textbook.

Most Fridays during the semester you will be assigned one of these videos to watch (occasionally two short companion videos), followed by a short quiz on Canvas. Each quiz has **two short application questions** — a word, a short phrase, or a number, just to confirm you watched and followed the idea — and **three written questions**: what you found most interesting, what you are wondering about now, and a brief explanation of one of the applications the video mentions. The written questions are graded on thoughtfulness rather than length; a short paragraph each is plenty. Assignments and their due dates are posted in Canvas.

There are **14 of these assignments, and I drop your three lowest scores.** You can therefore let three of them go — for a heavy week, an illness, or any other reason — without it touching your grade. My advice is to save those drops rather than spend them early; they are there for the weeks you do not see coming.

Toughloves (5%): This is a very conceptual class and many concepts rest on more foundational concepts. These foundational concepts ought to be internalized deeply and at least memorized in order to facilitate your learning of the other concepts of this course. To guide and encourage you to do this, you will be given a list of *Toughloves* — the key facts, definitions, and theorems you are expected to have memorized, about 5 to 10 per chapter. You will receive this list at the start of the semester; it will also serve as a useful reference sheet for you throughout the course.

Three times during the semester you will take a **Toughlove Quiz** over one unit's worth of these facts. Each quiz consists of **10 Toughloves drawn from that unit's list**, and is closed book, closed note, timed, and proctored in the testing center. You may retake these quizzes as many times as you like until you achieve mastery; your highest score is the one recorded.

Quiz	Covers	Initial due date
Toughlove Quiz 1	Chapters 1 & 2	Mon, Sep. 28
Toughlove Quiz 2	Chapters 3 & 4	Fri, Oct. 23
Toughlove Quiz 3	Chapters 5 & 6	Mon, Nov. 30

The Chapter 7 Toughloves appear on your reference sheet and are fair game on the final exam, but they have no quiz of their own. **Each quiz has an initial due date, listed above. If you fail to attempt the quiz before that due date you will receive a 25% penalty on your highest score for that quiz.** Retakes after the initial due date are still welcome and still raise your score.

Homework (15%): Each section of the course has assigned homework. Because you will have already read the material and worked through the examples in the reading guides, the homework load will not need to be a much as a lecture based course. We will work through examples together in class. All homework will be submitted via Canvas.

The required problems for every section are listed in the *Topic and Homework Schedule*, which is posted alongside this document. **Each set is due by 11:59 PM on the day it appears in that schedule** — generally two class meetings after we cover the section, so you always have student hours or time in class to ask your questions. Each lesson guide also lists a set of *extra practice problems*. These are optional and are not graded; they are there for when you want more repetitions before a Celebration. I am happy to look over your solutions to these in student hours.

Projects (10%): Over the course of the semester, you will complete three projects designed to apply class concepts to real-world situations. These projects will also introduce you to practical tools used in mathematics, particularly `Python`.

Projects will be assigned at various points during the semester. They may require both mathematical problem-solving and written explanations. Detailed instructions and rubrics will be provided for each project. The three projects are due by 11:59

PM on the following dates:

Project	Due date
Project 1	Fri, Oct. 9
Project 2	Fri, Nov. 6
Project 3	Tue, Nov. 24

Late Work: I do accept some late work. Here is a summary of my late work policies:

- **Pre-Reading Guides:** Accepted late with a penalty of 5% per day.
- **Lesson Quizzes:** No late work accepted — they exist to prepare you for a class meeting that has already happened — but I drop the lowest two scores.
- **Math The World Assignments:** Accepted late with a penalty of 5% per day, and I drop the lowest three scores.
- **Homework:** Accepted late with a penalty of 5% per day.
- **Projects:** Accepted late with a penalty of 5% per day.
- **Toughlove Quizzes:** Never "late" — you may keep retaking them — but missing the initial due date costs you 25% of your highest score, as described above.
- **The cut-off date for all late work is the scheduled Reading Day, Wed, Dec. 9, at 11:59 PM. No exceptions.**

Midterm Celebrations of Knowledge (30%): Three times during the semester we will pause to measure how far you have come. This will be done through midterm exams, which I call *Celebrations of Knowledge*. Don't let this Orwellian newspeak fool you: a Celebration of Knowledge is simply an exam with a friendlier name. It is also an opportunity for you to demonstrate how much you have learned.

There will be three Celebrations of Knowledge, each worth 10% of your final grade (totaling 30%). These will be paper-and-pencil exams proctored in the testing center. Before each celebration, we will have a dedicated review day that you will not want to miss. Consider using AI tools alongside your notes and textbook to prepare effectively.

Each Celebration is taken in the Testing Center during the three-day block following its review day. The Testing Center is open for these exams **Tuesday through Thursday, 4:00 – 10:00 PM**; you may go on whichever of the three days suits your schedule.

Exam	Covers	Review day (in class)	Testing Center window
Celebration 1	Chapters 1 & 2	Mon, Sep. 28	Tue–Thu, Sep. 29 – Oct. 1
Celebration 2	Chapters 3 & 4	Fri, Oct. 23	Tue–Thu, Oct. 27 – 29
Celebration 3	Chapters 5 & 6	Mon, Nov. 30	Tue–Thu, Dec. 1 – 3

Chapter 7 is not covered by any Celebration; it is examined on the comprehensive final.

Scoring above 85% on a Celebration also excuses you from the pre-reading guides for the next unit — see **Pre-Reading Guides** above.

If you know in advance that you cannot attend an exam on the scheduled date, you must inform me at least one week prior so we can arrange an alternative. If you miss an exam unexpectedly, you may be allowed to make it up depending on the circumstances, but you must contact me within one day. Failure to do so will result in a zero.

Final Exam (15%): The final exam is scheduled by the university and will take place during finals week, **Dec. 10 – 15** (exact day and time will be announced once the university publishes the exam schedule). The exam will be comprehensive, covering all material studied during the semester, and will be worth 15% of your final grade.

The final exam will be paper-and-pencil format. More details, along with a review session schedule, will be provided toward the end of the semester.

Core Learning Goals (CLG): Here is a reminder of the goals SVU has for each graduate. Students completing Southern Virginia's core curriculum are expected to attain the following college-level competencies:

- *Careful Writing:* Students will be able to present arguments in clear written English with proper spelling, grammar, vocabulary, and transitions.
- *Critical Thinking:* Students will be able to separate a conclusion from its premises and evaluate how well the premises support the conclusion.
- *Analytic Reasoning:* Students will be able to evaluate a body of evidence and draw appropriate conclusions.

Core Values: Lastly, Here is a reminder of the values SVU endeavors to foster in each student. Students demonstrate:

- *Scholarship* by coming prepared to class, focusing on activities in class, and meticulously completing homework assignments.
- *Discipleship* by being respectful of others and showing courtesy and concern for others and the learning environment.
- *Accountability* by faithfully attending class and coming on time, coming prepared, being aware of assignments given and completing them on time.
- *Enthusiasm* by participating in class discussions and completing in-class activities, showing interest in cultural material and discussions about mathematics in general.
- *Refinement* by going above and beyond in living the dress and grooming standards, their manner of speech and actions, cleaning up the classroom and following proper classroom etiquette. This includes not using cell phones (texting, etc.) or other electronic devices that may disrupt learning in the class.

Course Goals: After completion of the course you should be able to do the following:

- Show that you have learned the basic facts of this course, including mathematical notation and terminology used in this course. (SLO 1)
- Write systems of linear equations as matrix and vector equations, perform basic matrix algebra, solve systems of linear equations using various methods, including but not limited to using technology, and use and interpret vectors and linear transformations. (SLO 1, 2, 3, 4)
- Use the properties and theorems of a vector space, a subspace, and a basis for a vector space. Understand and apply the concepts of linear independence and linear dependence. (SLO 1, 2)
- Compute eigenvalues and eigenvectors, and generalized eigenvectors of a matrix, diagonalize a matrix and solve equations using the diagonalization process. (SLO 1, 3, 4)
- Become comfortable reading, analyzing, and writing basic mathematical proofs in relation to the subject matter. (SLO 1, 2, 5)

Title IX

Southern Virginia University is committed to providing an environment that promotes personal integrity, civility, and mutual respect and is free of all forms of sex discrimination and gender-based violence, including sexual assault, sexual harassment, gender-based harassment, domestic violence, dating violence, and stalking.

Southern Virginia University, in compliance with Title IX, supports the academic success of pregnant students and students with pregnancy-related conditions (pregnancy, childbirth, termination of pregnancy, lactation, and all related medical conditions or recovery). Students may request reasonable, related modifications from the University by contacting the Title IX Coordinator at titleix@svu.edu.

Title IX of the Education Amendments of 1972 states that "No person in the United States shall, on the basis of sex, be excluded from participation in, be denied the benefits of, or be subjected to discrimination under any education program or activity receiving Federal financial assistance." Title IX applies to all employees and students and covers discrimination in programs, admissions, and activities.

You can report any concerns to the Title IX Coordinator, Nathan Friesema (titleix@svu.edu), your professor, the Wellness Center, or any university administrator. Please be aware that all instructors are mandated reporters, so by law, we must disclose details relayed to us about any possible Title IX infraction to the University's Title IX coordinator.

Accommodations: Southern Virginia University is committed to providing a learning environment that accommodates and supports students with disabilities through accommodations. The Office of Accessibility Services oversees Academic Accommodations. Students with any type of physical, medical, psychological, or emotional disability may be eligible - through the Americans with Disabilities Act (ADA) - to receive accommodations to provide equal access to the academic settings. Any student seeking accommodations should contact the Office of Accessibility Services by emailing accessibility@svu.edu. Students are advised to take care of the necessary documentation and paperwork early in the semester. Accommodations are not made until the student follows the procedures outlined on the website, (https://catalog.svu.edu/policies/accessibility-and-accommodations) receives an official accommodation letter AND discusses it with their professors.

Academic Honesty: Following the code of conduct, (https://svu.edu/about/faith/code-of-conduct/), students are expected to "be honest in all things, obey the law and follow university policies, and not cheat, steal, or plagiarize." The objective of every faculty member is to empower students by providing opportunities for learning in the best environment possible. If there are questions about what is honest or dishonest behavior, please speak to your professor. Violations of academic honesty are reported to the Office of the Provost and appeals are handled through the student grievance process.

Wellness: We are located on the second floor of Main Hall, Room 234. We are open from 8am to 5pm Monday to Friday. To schedule an appointment with a therapist please Call or Text 540-261-8474, email counseling@svu.edu, or stop by in-person. We strive to accommodate same-day appointments for urgent needs whenever possible.

For Mental Health Emergencies After Hours:

Please use any of the following options:

- **Call or text 988** — Suicide and Crisis Lifeline
- **1-855-222-2046** — Rockbridge Area Community Services Behavioral Health Hotline
- **540-261-4911** — SVU Campus Security
- **Visit the ER** — Carilion Rockbridge Community Hospital
  1 Health Circle, Lexington, VA 24450
- **Call 911**

AI was used in the development and editing of this document.