ELEMENTARY LINEAR ALGEBRA

St. Olaf College · MATH 220

Dr. Matthew Wright · Spring 2025

Class Meetings

Monday, Wednesday, Friday at 11:50am – 12:45pm in RNS 204

Contact the Professor

If you have any questions or concerns about the course, email Prof. Wright at **wright5@stolaf.edu** or come to office hours. Prof. Wright generally responds quickly to emails from students during weekdays, but responses may take a bit longer on evenings and weekends.

Office Hours

Office hours are scheduled as follows in RMS 405:

Mondays 1 – 2pm, Wednesdays 2 – 3pm, Thursdays 10 – 11am, Fridays 9 – 10am

Feel free to drop by at any of these times. If the hours above don't work for you, just check Prof. Wright's Google Calendar and send an email to arrange a meeting at another time!

Web Site

The course web site is:

https://math220.mlwright.org

The professor maintains a course schedule and assignment calendar on this site. We will use Moodle for assignment submissions, grades, and items that require password protection. If you have any trouble accessing course materials, let Prof. Wright know.

Text

Jeffrey Holt, *Linear Algebra with Applications*, second edition (W.H. Freeman publishers, 2017)

You will need access to this text for assigned readings and homework problems. Any format (paper or electronic) is fine.

Course Content

Linear Algebra is one of the most elegant and applicable areas of mathematics, and it is key to many computational techniques in data analysis, computer science, physics, economics, and more. In this course, we will not only learn many of the theoretical tools required to tackle problems in these areas, but also build a foundation for studying more advanced mathematical topics. Moreover, we will experience mathematics as a human activity in which everyone can be successful.

Specific topics we will study this semester include:

- Systems of linear equations
- Vectors, linear combinations, span, and linear independence
- Linear transformations, matrix algebra, invertibility, and determinants
- Subspaces, basis, dimension, and the rank-nullity theorem
- Eigenvalues, eigenvectors, and diagonalizability
- Dot products, orthogonality, and projections
- Applications such as Markov chains, least squares, and singular value decomposition
- Abstract vector spaces

This course is a foundational course for the math major; required for computer science, statistics and data science, quantitative economics, and physics majors; and useful for biology, chemistry, and neuroscience majors and concentrations.

Grading

Your final grade will be a weighted average of the following:

Preview Exercises:	10%
Written Homework:	25%
Mathematica Labs:	10%
Midterm Exams:	30%
Final Exam:	25%

The following sections provide details about each of these grade items.

Preview Exercises

Reading a math textbook can be hard but is extremely useful. You will be required to read a portion of the text and answer some comprehension questions before each class. The purpose of this is to expose you to concepts for class and to prompt questions before class. You will submit your responses to Moodle, and they will be graded for completion. Since the purpose of this is to prepare for class, responses will be due at the beginning of class and *not* accepted late.

Written Homework

Mathematics is learned by doing — that is, by applying mathematical ideas to solve problems and communicating solutions. For this reason, written homework will be assigned nearly every class period and due on the next class day.

The assigned problems represent the minimum needed to gain a basic understanding of course concepts and examples. If you desire to achieve an above-average grade for the course, you will need to work more problems and read the text carefully. Struggling with homework problems is not a sign of failure, but part of the learning process. Asking

questions is also key to learning—Prof. Wright is happy to discuss questions with you, so please do not hesitate to come to office hours or request to meet at a different time.

Collaboration with peers is encouraged on homework, but you must submit your own work and completely understand your solutions. See the section *Getting Help and Academic Integrity* below for more details.

It's crucial to keep up with the homework in this course. Therefore, work submitted up to 2 hours late will incur a 10% penalty. Work submitted between 2 and 24 hours late will incur a 30% penalty. Work submitted later than 24 hours will not be accepted for credit. Because of this strict policy, your lowest *three* homework assignments will be dropped. You should aim to turn in all homework on time, and save your dropped homework in case you become ill or things come up that prevent you from turning in homework on time.

Mathematica Labs

Mathematica is powerful mathematical software for computation and visualization. This course will involve frequent Mathematica labs, which are designed to help you see linear algebra in action and develop computational skills for mathematical and quantitative inquiry. These will be due at specified times and subject to the same late work policy as written homework (see above). Your lowest Mathematica lab score will be dropped.

As a St. Olaf student, you can install Mathematica on your computer for free — refer to the [St. Olaf IT Knowledge Base](#) for instructions. There are also computers available on campus with Mathematica, such as the computers in Tomson 188.

Exams

This course will involve three midterm exams and one final exam. Exams are scheduled as follows:

Midterm Exam 1: Friday, February 28, in class

Midterm Exam 2: Friday, March 28, in class

Midterm Exam 3: Friday, May 2, in class

Final Exam: Saturday, May 17, 1:00 – 3:00pm

Note that our final exam is on a Saturday! Put this exam time in your calendar and plan to be present, as final exams are nearly impossible to reschedule. By college policy, *travel arrangements are not a valid reason to reschedule the exam*.

The St. Olaf Honor Pledge applies to exams in this course. The Honor Pledge reads:

"I pledge my honor that on this examination I have neither given nor received assistance not explicitly approved by the professor and that I have seen no dishonest work."

The Honor Pledge is violated when information that could result in an unfair advantage for one or more students is given or received before, during, or after an exam. On each exam, students will be asked to either affirm the Honor Pledge or indicate awareness of violations by intentionally not signing the pledge.

Strategies for Success

- Attend class faithfully and participate in class activities.
- Work with other students. Make friends in class, discuss linear algebra with them, work on the homework together, and study together for exams. You will find that you will both learn from and teach your classmates.
- Keep up with the assignments. Start early — don't wait until the last minute!
- Don't give up when you get stuck, or when your Mathematica code doesn't work. Understand that mistakes are opportunities for learning.
- Ask questions! When you encounter trouble, seek help! If office hours don't work for you, send Prof. Wright an email to arrange a different meeting time.

Getting Help and Academic Integrity

Collaboration with peers is encouraged in this class on everything except exams. Discussing mathematics with other people is an important part of learning mathematics. However, collaboration must be done appropriately and with integrity.

Inappropriate "collaboration" includes copying answers from a friend, looking up homework solutions in online forums, asking an artificial intelligence to do your homework, any use of any other resource that does the thinking for you. Remember, the goals of this include developing and demonstrating your own understanding of linear algebra. You *will not* achieve these goals if you outsource your thinking to other experts (human or artificial). You *will* achieve these goals through time and effort spent solving linear algebra problems.

Claiming someone's or something's work as your own will earn you a failing grade on the work in question. Don't do it. For more information, see the *Academic Integrity* section of *The Book* (wp.stolaf.edu/thebook/academic/integrity).

Prof. Wright is your primary resource for help in this course and is always happy to talk with you. When you need help, or if you have any concerns about the course, please email Prof. Wright or visit his office hours. Furthermore, the Academic Success Center offers academic coaching and other services – email the Academic Success Center for more information.

In summary:
- It's good to discuss course material and homework with classmates and the professor.
- It's not good to ask someone (or an artificial intelligence) to do the homework for you.
- If you have any questions or concerns about this course, talk with Prof. Wright.

Attendance

It's important for you to be present and to take an active role in class each day. If you don't come to class, you're missing out on the discussion and learning that takes place in class. For this reason, it's crucial to develop consistent attendance habits from the beginning of the semester.

If you miss two consecutive classes without contacting Prof. Wright, he will reach out to the Dean of Students Office to make sure you're getting the support you need.

If you miss four classes (consecutive or not) without contacting Prof. Wright, he will require you to complete an additional form of engagement to show that you're making an effort to keep up with the course.

If you miss eight classes for any reason(s), and regardless of whether you contact Prof. Wright, he will encourage you to consider dropping the course. Eight class sessions amount to almost one quarter of all class sessions, which is an excessive amount of absences that severely detracts from your learning throughout the semester.

Inclusivity and Access

Prof. Wright is committed to facilitating a safe, caring, and inclusive learning community, respecting those of differing backgrounds and beliefs. As part of St. Olaf College, we aim to be respectful to everyone in this class, regardless of race, ethnicity, religion, gender, or sexual orientation. All students are capable of success in mathematics, and Prof. Wright aims to create an environment in which all can succeed. If you have any questions or concerns, don't hesitate to talk with Prof. Wright.

If you have any concerns about access to course materials, or if English is not your first language and this causes you concern, please talk with Prof. Wright.

Health and Accommodations

Prof. Wright is committed to supporting all students. He recognizes that emotional, physical, or psychological experiences, both in and out of the classroom, have the potential to distract students from learning. If you have any concerns, please do not hesitate to contact the professor—he is available to listen and to discuss what resources may be available to you.

If you are sick, please do not come to class—instead, email the professor. Face masks to prevent the spread of respiratory diseases are welcome in class. Please respect individuals who may choose to wear face masks.

If you have an accommodation letter from the Disability and Access (DAC) office, please meet with the professor early in the course to discuss, plan, and implement your accommodations in the course. Otherwise, if you have or think you have a disability please contact the Disability and Access office at 507-786-3288 or wp.stolaf.edu/academic-support/dac/.