

MA 305. Introductory Linear Algebra and Matrices

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Lectures: Asynchronous available on the course Moodle page

Office Hours: Tuesdays (1 - 2 pm) and Thursdays (8:30 - 9:30 am), zoom link also available in Moodle; psw **NCSU**

Course text

There is no required textbook for this course. However, several textbooks available through the NC State Libraries are good resources and specific chapters will be recommended for each course unit:

1. Olver P.J., Shakiban C. (2018) Applied Linear Algebra. Undergraduate Texts in Mathematics. Springer
2. Nair M.T., Singh A. (2018) Linear Algebra. Springer
3. Said-Houari B. (2017) Linear Algebra. Compact Textbooks in Mathematics. Birkhäuser

Catalog Description

Prerequisite: MA 241 or MA231

Course Catalog Description: The course is an elementary introduction to matrix theory and linear algebra. Emphasis is given to topics that will be useful in other disciplines, including systems of equations, Euclidean vector spaces, determinants, eigenvalues and eigenvectors, linear transformations, similarity, and applications such as numerical solutions of equations and computer graphics. Compares with MA 405 Introductory Linear Algebra, more emphasis is placed on methods and calculations,. Credit is not allowed for both MA 305 and MA 405.

Learning Objectives

Upon successful completion of this course, students will be able to:

- Determining solvability of systems of linear equations, and solving such systems.
- Execute matrix operations, such as addition and multiplication.
- Explain the concept of subspaces, and find fundamental subspaces for matrices.
- Describe concepts of linear transformations, basis vectors, change of basis, and matrix representations.
- Accurately interpret determinant and trace, as well as compute such quantities.
- Explain key ideas for diagonalizability, including eigenvectors, Jordan form. Describe and execute algorithms for finding eigenvalues and eigenvectors.
- Explain key ideas related to orthogonality, such as inner-products, Gram-Schmidt, projections and the SVD, and compute related quantities.
- Explain some basic applications of linear algebra, such as least squares, calculus and geometry in multiple dimensions, and solutions of differential equations.

In addition to these concrete competencies, a major goal of the course is to help strengthen students quantitative reasoning, and develop sufficient mathematical background for later courses in applied fields.

Course Structure and Rules of Engagement

All course learning materials and resources are housed in Moodle: <http://moodle.wolfware.ncsu.edu/>. The video lectures are pre-recorded and made available in Moodle, along with the pdf course notes. We (instructor and TA) will also have synchronous office hours via Zoom https://go.ncsu.edu/ma305office_hours when the students can get help with understanding/clarifying the material but also experience small group activities. The goal for these sessions is for students to work with their peers, generate questions, ideas, and experience opportunities for in-depth learning. Given the online nature of the course, it is important for each of you to communicate and interact and “try” on ideas with your peers, instructor, TA.

Grading Policy

Your final grade in this course will be determined by grades earned on the final exam, three term tests, and online homework assignments. The weighting of these components are as follows:

· Homework	25%
· Two term tests	40 %
Thursday, June 2	
Thursday, June 16	
· Final Exam	35%
Friday, June 24	

Grading Scale: $97 \leq A+ \leq 100$, $93 \leq A < 97$, $90 \leq A- < 93$, $87 \leq B+ < 90$, $83 \leq B < 87$, $80 \leq B- < 83 \dots$

Note: I do NOT curve grades in this course. It is theoretically possible for everyone in the class to get an A (or an F). Your performance depends only on how you do, not on how everyone else in the class does. It is therefore in your best interests to help your classmates, while keeping the academic integrity policy in mind.

Testing

Procedural details about the tests will be made available in Moodle. The term tests will be hour-long exams that you will be able to take during a prescribed time window (the dates above are *tentative*). The final exam is two hour long and will be set up in a similar way. The Moodle site will have guidance regarding the material covered in each tests. The final exam is mandatory, cumulative.

Homework Assignments will be submitted using an Internet-based homework service called WeBWorK. The lowest 3 homework grades will be dropped. Use these drops wisely. The links to the homework assignments are available in Moodle.

Corrections to the grading

If you believe an error has been made in grading on a test write a statement making your case and email it to me. Partial credit will be given to partial correct solution that was neatly presented. You have *1 week after the test is returned* to request re-grading.

Make-Up Policy

Late assignments and make-up work will only be allowed for excused absences. These include university duties or trips (certified by an appropriate faculty or staff member), required court attendance (certified by the Clerk of Court), or religious observances (certified by the Department of Parent and Family Services 515-2441). You should contact me by email before any anticipated excused absence. If you have an unanticipated excused absence (for example, a medical emergency), you should contact me within one week of returning to class. For complete attendance and excused absence policies, please see: <https://policies.ncsu.edu/regulation/reg-02-20-03-attendance-regulations/>.

Grading/Scheduling Changing Options

Undergraduates have the option to make changes to their enrollment status for this course. The late drop date for the Summer 1 2021 semester is June 6, 2022 . This summer semester the University will NO LONGER offer the "Enhanced Satisfactory/ Unsatisfactory Grading" options.

Communication: All announcements will be made from Moodle. Any general questions about the class should be submitted in the Moodle forum —Ask the class! (discussion forum for students)". Questions of a personal nature that don't concern the entire class should be sent from your official ncsu.edu email address.

Incomplete Grades will be handled on an individual basis. Note, however, that if an extended deadline is not authorized by an instructor or department, an unfinished incomplete grade will automatically change to an F after either (a) the end of the next regular semester in which the student is enrolled (not including summer sessions), or (b) the end of 12 months if the student is not enrolled, whichever is shorter. See: <https://policies.ncsu.edu/regulation/reg-02-50-03/>.

Academic Integrity Statement and Academic Dishonesty

Both faculty and students at North Carolina State University have a responsibility to maintain academic integrity. Students are required to comply with the university policy on academic integrity/honesty found in the Code of Student Conduct: <https://policies.ncsu.edu/policy/pol-11-35-01/>. It is my understanding and expectation that your signature on any test or assignment means that you have adhered to the Pack Pledge:

"Academic dishonesty is the giving, taking, or presenting of information or material by a student that unethically or fraudulently aids oneself or another on any work which is to be considered in the determination of a grade or the completion of academic requirements or the enhancement of that

student's record or academic career." (NCSU Code of Student Conduct)

Scholarly activity is marked by honesty, fairness and rigor. A scholar does not take credit for the work of others, does not take unfair advantage of others, and does not perform acts that frustrate the scholarly efforts of others. The violation of any of these principles is academic dishonesty. Penalties for a violation: For the first violation, you will receive a zero for your work and be put on academic integrity probation for the remainder of your stay at NCSU. The second violation may result in your suspension from NCSU. Violations of academic integrity will be handled in accordance with the Student Discipline Procedures (NCSU REG 11.35.02).

Electronically-hosted Components

Please be advised that this course is being recorded for current (and potential future) educational purposes. By your continued participation in this recorded course, you are providing your permission to be recorded. Please see the relevant technology requirements (Zoom, WeBWork) provided in Moodle. Please be advised that students may disclose personally identifiable information to other students in the course, via electronic tools like email or web-postings. Examples include online discussions of class topics and posting of student coursework. All students are expected to respect the privacy of each other by not sharing or using such information outside the course.

Accommodations for Students with Disabilities

Reasonable accommodations will be made for students with verifiable disabilities. In order to take advantage of available accommodations, students must register with the Disability Resource Office at Holmes Hall, Suite 304, 2751 Cates Avenue, Campus Box 7509, 919-515-7653. For more information on NC State's policy on working with students with disabilities, please see the Academic Accommodations for Students with Disabilities Regulation (REG02.20.01).

Non-Discrimination Policy

NC State prohibits discrimination, harassment, and retaliation based on a person's age (40 years or older), color, disability, genetic information, gender identity, national origin, race, religion, sex (including pregnancy), sexual orientation or veteran status. If you feel that you have been the subject of prohibited discrimination, harassment, or retaliation, you should contact the Office for Institutional Equity and Diversity (OIED) at 919-513-0574. NC State's policies and regulations covering discrimination, harassment, and retaliation may be accessed at <http://policies.ncsu.edu/policy/pol-04-25-05> or <http://oied.ncsu.edu/divweb>.

Health and Well-Being Resources

These are difficult times, and academic and personal stress are natural results. Everyone is encouraged to take care of themselves and their peers. If you need additional support, there are many resources on campus to help you:

- NCSU Counseling Center
- Student Health Center
- NC State CARES Team: As members of the NC State Wolfpack community, we each share a personal responsibility to express concern for one another and to ensure that our campus remains a healthy and safe environment for learning. Occasionally, you may come across a classmate whose personal behavior concerns or worries you, either for your classmate's well-being, for your well-being or for the well-being of others. When this is the case, I would encourage you to report the behavior to the NC State CARES team: Share a Concern.
- If you or someone you know are experiencing food, housing or financial insecurity, please see the Pack Essentials Program.

Community Standards related to COVID-19

We are all responsible for protecting ourselves and our community. Please see the Community Standards and Rule 04.21.01 regarding Personal Safety Requirements Related to COVID-19.

NC State Rules and Regulations

Students are responsible for reviewing the NC State University Policies, Rules, and Regulations (PRRs) which pertain to their course rights and responsibilities, including those referenced both below and above in this syllabus:

- Equal Opportunity and Non-Discrimination Policy Statement with additional references at <https://oied.ncsu.edu/equity/po>
- Code of Student Conduct

Student Evaluations

Online class evaluations will be available for students to complete during the last three weeks of classes. You will receive an email message directing you to a website where you can login using your Unity ID and complete the evaluation. All evaluations are confidential; instructors will not know how any one student responded to any question, and students will not know the ratings for any instructors.

Other Remarks

- All course communications will be sent via the Moodle announcement forum to your official ncsu.edu email address.
- You are more than welcome to email me to schedule a one-on-one meeting to discuss issues related to the course.
- I prefer to be contacted by email (not phone). Please make sure that you include your name and the course number and section in the subject line of your email.
- Your email address registered with the NCSU online directory will be used for announcements associated with this class. It is your responsibility to maintain a valid email address and check/empty your Inbox regularly.
- The test and homework grades will be recorded in the Moodle gradebook. Please notify me immediately if you notice any discrepancies in your grades.
- Please check the course webpage regularly, as it will be continuously updated with announcements, any changes in the schedule, homework problems, solutions, review sheets, and other additional course materials.
- Please mark the test dates on your calendar and do not set your dental/doctor/interview... appointments on top of the test dates.
- Be respectful to your peers and to your instructor.