

MA 305 Course Syllabus

MA 305 - Introductory Linear Algebra and Matrices

Section 001

Spring 2022

3 Credit Hours

Course Description

This course is an elementary introduction to matrix theory and linear algebra. Emphasis is given to topics that are 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. Compared 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 Outcomes

Students will learn the mathematics of the following concepts, apply them in computations with Matlab, and learn about their real-world applications:

Matrix Arithmetic, Matrix Transposes and Inverses, Systems of Linear Equations, LU factorizations, Symmetric Matrices, General Linear Systems, Determinants, Vector Spaces and Subspaces, Span and Linear Independence, Basis and Dimension, Fundamental Subspaces of a Matrix, Fundamental Theorem of Linear Algebra, Graphs, Inner Products and Norms, Orthogonal Bases, Coordinates, Orthogonal Matrices, QR factorization, Orthogonal Subspaces and Orthogonal Complements, Least Squares and Line Fitting, Eigenvalues and Eigenvectors, Diagonalization, Matrix Powers

Course Structure

This is a lecture course, with 3 midterm tests and a final

- Test 1: 1 February 2022, 8:30-9:45am
- Test 2: 1 March 2022, 8:30-9:45am
- Test 3: 5 April 2022, 8:30-9:45am
- Final: 28 April 2022, 8:30-11am

Course Policies

Please: No use of electronic devices during class, except for note taking. No eating and drinking during class.

The three midterm tests and the final are closed resources (books, notes, internet, phones, calculators, humans).

Instructors

Dr. Ilse Ipsen (ipsen) - *Instructor*

Email: ipsen@ncsu.edu

Web Page: <https://ipsen.math.ncsu.edu/>

Phone: N/A

Office Location: Zoom

Office Hours: TH 10-11am

Course Meetings**Lecture**

Days: TH

Time: 8:30am - 9:45am

Campus: Main

Location: 1102 SAS Hall

This meeting is required.

Course Materials**Textbooks**

Applied Linear Algebra - Peter J. Olver and Chehrzad Shakiban

Edition: Second

ISBN: 978-3-319-910 41-3 (eBook)

Web Link: <https://catalog.lib.ncsu.edu/catalog/NCU4441965>

Cost: free e-book in NCState library

This textbook is required.

Expenses

None.

Materials

None.

Requisites and Restrictions**Prerequisites**

MA 241, or MA 231 with MA 132

Co-requisites**Restrictions**

None.

Transportation

This course will not require students to provide their own transportation. Non-scheduled class time for field trips or out-of-class activities is NOT required for this class.

Safety & Risk Assumptions

None.

Grading**Grade Components**

Component	Weight	Details

Midterm Test 1	20 (2 best tests out of 3)	Mandatory
Midterm Test 2	20 (2 best tests out of 3)	Mandatory
Midterm Test 3	20 (2 best tests out of 3)	Mandatory
Final	30	Mandatory
Homeworks	30 (n-1 best out of n homeworks)	Mandatory. Weekly homeworks (Moodle Quiz, Gradescope, WeBWorK, Matlab)

Letter Grades

This Course uses Standard NCSU Letter Grading Scale

97	≤	A+	≤	100
93	≤	A	<	97
90	≤	A-	<	93
87	≤	B+	<	90
83	≤	B	<	87
80	≤	B-	<	83
77	≤	C+	<	80
73	≤	C	<	77
70	≤	C-	<	73
67	≤	D	<	70
63	≤	D	<	67
60	≤	D-	<	63
0	≤	F	<	60

Requirements for Credit-Only (S/U) Grading

In order to receive a grade of S, students are required to take all exams and quizzes, complete all assignments, and earn a grade of C- or better. Conversion from letter grading to credit only (S/U) grading is subject to university deadlines. Refer to the Registration and Records calendar for deadlines related to grading. For more details refer to <http://policies.ncsu.edu/regulation/reg-02-20-15>.

Requirements for Auditors (AU)

Information about and requirements for auditing a course can be found at <http://policies.ncsu.edu/regulation/reg-02-20-04>.

Policies on Incomplete Grades

If an extended deadline is not authorized by the 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. Incompletes that change to F will count as an attempted course on transcripts. The burden of fulfilling an incomplete grade is the responsibility of the student. The university policy on incomplete grades is located at <http://policies.ncsu.edu/regulation/reg-02-50-3>.

Late Assignments

2 late homework assignments allowed (no questions asked), after that no late homeworks will be accepted.

A missed test counts as the lowest of 3 tests.

Attendance Policy

For complete attendance and excused absence policies, please see <http://policies.ncsu.edu/regulation/reg-02-20-03>

Attendance Policy

Attendance is required for all lectures, midterm tests and the final.

Absences Policy

None.

Makeup Work Policy

2 late homeworks allowed (no questions asked). A missed test counts as a test with the lowest score.

Additional Excuses Policy

None.

Academic Integrity**Academic Integrity**

Students are required to comply with the university policy on academic integrity found in the Code of Student Conduct found at <http://policies.ncsu.edu/policy/pol-11-35-01>. Abide by the Code of Student Conduct (NCSU POL11.35.01) and Pack Pledge. Violations of academic integrity will be handled in accordance with the Student Discipline Procedures (NCSU REG 11.35.02).

Academic Honesty

See <http://policies.ncsu.edu/policy/pol-11-35-01> for a detailed explanation of academic honesty.
None.

Honor Pledge

Your submission of any test and the final indicates "I have neither given nor received unauthorized aid on this exam."

Digital Course Components

Students may be required to disclose personally identifiable information to other students in the course, via digital tools, such as email or web-postings, where relevant to the course. 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.

Digital Course Components:

Video-taped lectures.

Homeworks in WebWorK, Moodle Quiz and Matlab.

E-textbook, online resources on Moodle class page.

Accommodations for 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, 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) (<https://policies.ncsu.edu/regulation/reg-02-20-01/>).

Non-Discrimination Policy

NC State provides equal opportunity and affirmative action efforts, and prohibits all forms of unlawful discrimination, harassment, and retaliation ("Prohibited Conduct") that are based upon a person's race, color, religion, sex (including pregnancy), national origin, age (40 or older), disability, gender identity, genetic information, sexual orientation, or veteran status (individually and collectively, "Protected Status"). Additional information as to each Protected Status is included in NCSU REG 04.25.02 (Discrimination, Harassment and Retaliation Complaint Procedure). 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 <https://oied.ncsu.edu/divweb/>. Any person who feels that he or she has been the subject of prohibited discrimination, harassment, or retaliation should contact the Office for Equal Opportunity (OEO) at 919-515-3148.

Course Schedule

NOTE: The course schedule is subject to change.

Lecture TH 8:30am - 9:45am — Midterm Test 1 — 02/01/2022 - 02/01/2022

- Test 1 is open brain, but closed everything else: physical resources (books, notes, solution manuals), online resources and any use of the internet, calculators (external or apps), phones and other electronic devices, people.
- The use of unauthorized aid will incur severe disciplinary action, including expulsion from the university and loss of scholarships.

Lecture TH 8:30am - 9:45am — Midterm Test 2 — 03/01/2022 - 03/01/2022

- Test 2 is open brain, but closed everything else: physical resources (books, notes, solution manuals), online resources and any use of the internet, calculators (external or apps), phones and other electronic devices, people.
- The use of unauthorized aid will incur severe disciplinary action, including expulsion from the university and loss of scholarships.

Lecture TH 8:30am - 9:45am — Midterm Test 3 — 04/05/2022 - 04/05/2022

- Test 3 is open brain, but closed everything else: physical resources (books, notes, solution manuals), online resources and any use of the internet, calculators (external or apps), phones and other electronic devices, people.
- The use of unauthorized aid will incur severe disciplinary action, including expulsion from the university and loss of scholarships.

Lecture TH 8:30am - 9:45am — Final exam — 04/28/2022 - 04/28/2022

8:30-11am. Final is comprehensive, covers all course material.

- The Final is open brain, but closed everything else: physical resources (books, notes, solution manuals), online resources and any use of the internet, calculators (external or apps), phones and other electronic devices, people.
- The use of unauthorized aid will incur severe disciplinary action, including expulsion from the university and loss of scholarships.