

MA 723 Course Syllabus

MA 723 - Theory of Matrices and Applications

Section 001

Spring 2019

3 Credit Hours

Course Description

- Eigenvalues, invariant subspaces and eigenvectors of complex matrices
- Determinants, characteristic and minimal polynomials
- Jordan canonical form, Schur decomposition
- Matrices: Defective, diagonalizable, normal, Hermitian, positive (semi)-definite
- Perturbation theory, eigenvalue localization
- Conditioning of eigenvalues and invariant subspaces
- Matrix functions

Learning Outcomes

Canonical forms, functions of matrices, variational methods, perturbation theory, numerical methods, nonnegative matrices, applications to differential equations, Markov chains

Course Structure

This is a lecture course, with 3 in-class exams, and weekly homeworks.

Instructors

Dr. Ilse Ipsen (ipsen) - *Instructor*

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Office Location: 4234 SAS Hall

Office Hours: MWF 9:20-10:00am

Course Meetings

Lecture

Days: MWF

Time: 8:30am - 9:20am

Campus: Main

Location: 1218 SAS Hall

This meeting is required.

Course Materials

Textbooks

Numerical Methods in Matrix Computations - Åke Björck

Edition: first

Web Link: <http://catalog.lib.ncsu.edu/record/NCSU3309058>

Cost: \$0 (e-book in NCSU library)

This textbook is required.

Matrix Analysis - Roger A. Horn and Charles R. Johnson

Edition: second

Web Link: <https://catalog.lib.ncsu.edu/record/NCSU2728818>

Cost: \$0 (e-book in NCSU library)

This textbook is required.

Expenses

None.

Materials

None.

Requisites and Restrictions

Prerequisites

MA523 or MA520

Co-requisites

None.

Restrictions

None.

General Education Program (GEP) Information

GEP Category

This course does not fulfill a General Education Program category.

GEP Co-requisites

This course does not fulfill a General Education Program co-requisite.

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 1	35 (best of two midterms)	
Midterm 2	35 (best of two midterms)	
Final exam	35	
Homeworks	30	

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	≤	F	<	63
0	≤	F	<	60

Requirements for Credit-Only (S/U) Grading

Performance in research, seminar and independent study types of courses (6xx and 8xx) is evaluated as either "S" (Satisfactory) or "U" (Unsatisfactory), and these grades are not used in computing the grade point average. For credit only courses (S/U) the requirements necessary to obtain the grade of "S" must be clearly outlined.

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 Graduate School, 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) by 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-02-50-03>. Additional information relative to incomplete grades for graduate students can be found in the Graduate Administrative Handbook in Section 3.18.F at http://www.fis.ncsu.edu/grad_publicns/handbook/

Late Assignments

Late assignments are not accepted.

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 lectures, at the midterms and the final.

Absences Policy

None.

Makeup Work Policy

None.

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>
None.

Academic Honesty

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

Honor Pledge

Your signature on any test or assignment indicates "I have neither given nor received unauthorized aid on this test or assignment."

Electronically-Hosted Course Components

There are no electronically-hosted components for this course.

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 University provides equality of opportunity in education and employment for all students and employees. Accordingly, NC State affirms its commitment to maintain a work environment for all employees and an academic environment for all students that is free from all forms of discrimination. Discrimination based on race, color, religion, creed, sex, national origin, age, disability, veteran status, or sexual orientation is a violation of state and federal law and/or NC State University policy and will not be tolerated. Harassment of any person (either in the form of quid pro quo or creation of a hostile environment) based on race, color, religion, creed, sex, national origin, age, disability, veteran status, or sexual orientation also is a violation of state and federal law and/or NC State University policy and will not be tolerated. Retaliation against any person who complains about discrimination is also prohibited. 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://www.ncsu.edu/equal_op/. 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 MWF 8:30am - 9:20am — Midterm 1 — 02/08/2019 - 02/08/2019

In class. No aides allowed (Closed book, notes, electronic equipment)

Lecture MWF 8:30am - 9:20am — Midterm 2 — 03/22/2019 - 03/22/2019

In class. No aides allowed (Closed book, notes, electronic equipment)

Lecture MWF 8:30am - 9:20am — Final exam — 05/06/2019 - 05/06/2019

8-11am. In class. Final is comprehensive, covers all course material.

In class. No aides allowed (Closed book, notes, electronic equipment)