

22-Aug-09

Math 510

Course Information and Policies

Course web-site: <http://www.public.iastate.edu/~lhogben/math510.html>

Text: Denis Serre, *Matrices: Theory and Applications*

Lectures: MWF 9-9:50 AM in Carver 8

Instructor Leslie Hogben

E-mail: LHogben@iastate.edu

Personal web-sites: <http://www.public.iastate.edu/~lhogben/>,

Telephone: 294-8168 (message may not be received; e-mail or in person is better)

Office: 488 Carver

Office Hours: MWF 10-10:50 AM, by appointment, or whenever you find me

Grader Nicole Kingsley

Math 510 is the core graduate linear algebra course that prepares students to use linear algebra in their work and prepares students for part of the Algebra Qualifying Examination.

Content (See also daily updates on web-site.)

Vector spaces: subspaces, basis, coordinate vectors, change of basis.

Matrix arithmetic for partitioned matrices.

Linear transformations: matrix of a transformation, kernel, range, rank, Dimension Theorem, linear functionals, dual basis.

Determinants and their properties.

Inner products: Cauchy-Schwartz inequality, orthonormality, Gram-Schmidt, projection, Hermitian adjoint of a matrix and transformation.

Eigenvalues, eigenvectors, characteristic polynomial, minimal polynomial, Cayley-Hamilton Theorem, algebraic and geometric multiplicity, diagonalization.

Unitary matrices and transformations, normal matrices and transformations, unitary diagonalization of normal matrices, Spectral Theorem, Schur's Unitary Triangularization Theorem.

Canonical forms: Jordan canonical form, rational canonical form, invariant factors, elementary divisors, Primary Decomposition Theorem.

Hermitian matrices, Rayleigh-Ritz Theorem, variational characterization of eigenvalues (min-max) and applications, positive-definite matrices.

Assessment Your grade will be based on:

1 one hour exam	50 points
1 take-home examination	50 points (computation of canonical forms using computer)
final examination	100 points
graded homework	50 points (5 assignments, 10 points each)

See web-site for dates.

Your grade will not be worse than that obtained from an 85, 75, 60, 50 scale applied to the above total, and may be better. There is no curve in the traditional sense, in that you are not competing against each other, but against an objective standard- the goal is to have everyone succeed.

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Homework Most of the homework assigned in each class and listed on the web-site will not be graded, although some will be corrected to provide feedback; it is intended to help you learn the material and prepare for the examinations. There will be five graded homework assignments, clearly identified.

Collaboration and outside resources You are encouraged to work together and/or utilize the library or internet, using whatever method helps you learn, except that the following restrictions apply to graded work:

- You should not use outside sources (books, internet, people not involved in this course) for any graded work.
- You may discuss graded homework assignments with other students enrolled in this class and/or with me (Leslie) but should not take any notes from these discussions. You must write up your own work and I should not be able to determine with whom you discussed it when I read it.
- You should not discuss your take-home test with anyone except me or Nicole.

Make-up examination policy Permission to make up a missed examination is rare; if approval is given, the missed examination will be made up by giving greater weight to the final examination.

Disability Information Iowa State University complies with the American with Disabilities Act and Section 504 of the Rehabilitation Act. If a student has a disability that qualifies and requires accommodations, he/she should contact the Disability Resources (DR) office for information on appropriate policies and procedures. DR is located on the main floor of the Student Services Building, Room 1076; their phone is 515-294-6624. Any student who requires an accommodation under such provisions should contact Leslie Hogben privately as soon as possible and no later than the end of the second week of class or as soon as documentation of the need for accommodation is obtained. Contact may be made by e-mail (LHogben@iastate.edu) or in person (office 488 Carver). No retroactive accommodations will be provided in this class.

All audible ringers of cell phones, pagers, etc. must be turned off during class, and all such electronic devices must be turned off during examinations.

Any change to these policies will be announced in class, by e-mail and on the web-site.