Math 2371 - Matrices & Linear Operators 2
Guidelines and Syllabus

Course Overview: The primary goal of this two-semester sequence is to prepare students for the preliminary examination in linear algebra. As such, its syllabus is identical to that of the exam, which is reproduced at the bottom of this document. The syllabus, prior exams, and other material may also be viewed at:

`http://www.mathematics.pitt.edu/graduate/graduate-handbook`

This second semester will cover Chapters 6–9 of Hoffman & Kunze and a bit of Lax (see below).

Instructor: Jason DeBlois. My office is Thackeray 407, and my email is `jdeblois@pitt.edu`.
Course website: `http://www.pitt.edu/~jdeblois/S19_matrices.html`
Office Hours: TBD. Check the course website.

Textbooks:

- *Linear Algebra* (2nd edition), by Kenneth Hoffman and Ray Kunze.
- *Linear Algebra and its Applications* (2nd edition), by Peter Lax.

Grades: Your course grade will be determined as follows:

- Homework, 30%. (Assigned and collected weekly.)
- Midterms 1 and 2, 20% each.
- Final exam, 30%.

Academic Integrity: You are encouraged to work on problems with your fellow students, and you may seek inspiration on the web or elsewhere. **But your written solutions to homework and test problems must be your own.** On any assignment, if I discover that you have copied a solution from the web, another student, or any other source, then you will receive a zero score for the entire assigment. If it happens repeatedly, you will fail the course.

Preliminary exam syllabus

Vector spaces: subspaces, linear independence, bases, dimension, linear functionals, dual space, adjoints, inverses, and reducibility.

Matrices and linear transformations: range, kernel, determinants, isomorphisms, change of basis, eigenvalues, eigenvectors, minimax theory of eigenvalues, Gersgorin disks, minimal polynomial, Cayley-Hamilton theorem, similarity, polar and singular value decomposition, spectral theorem, Jordan canonical forms. Heremitian, symmetric, and positive definite matrices. matrix and vector norms, convergence of sequences, powers etc. of matrices.

Inner product spaces: inner products, norms, orthogonality, projections, orthogonal complement, orthonormal basis, Gram-Schmidt orthogonalization, isometries, normal operators, spectral theory, basic inequalities such as Cauchy-Schwarz.