Learning Objectives

Math 220 Matrices
Upon successful completion of Math 220, the student should be able to:

1. Know what is meant by a system of linear equations (or linear system) and its solution set
2. Know how to write down the coefficient matrix and augmented matrix of a linear system
3. Use elementary row operations to reduce matrices to echelon forms
4. Make use of echelon forms in finding the solution sets of linear systems
5. Know how to manipulate with vectors in Euclidean space
6. Understand the meaning of linear independence/dependence and span
7. Interpret linear systems as vector equations
8. Define matrix vector product and be able to interpet linear systems as matrix equations
9. Write the general solution of linear systems in parametric vector form
10. Understand the relation between the solution set of a consistent inhomogeneous linear system and its associated homogeneous equation
11. Determine whether sets of vectors are linearly independent or dependent
12. Know what is meant by a linear transformation between Euclidean spaces
13. Determine the standard matrix of a linear transformation
14. Give the geometric description of some matrices
15. Understand the notion of one-to-one mapping and onto mapping
16. Know how to scale a matrix, take the transpose of a matrix, and how to add and multiply matrices
17. Know what is meant by an invertible matrix
18. Know how to compute the inverse of a matrix, if it exists
19. Understand the various characterizations of an invertible matrix
20. Determine if a given subset of a Euclidean space is a subspace
21. Know what is the column space and nullspace of a matrix and how to determine these spaces
22. Find a basis of a subspace of a Euclidean space
23. Define the concept of dimension and how to use the rank plus nullity theorem
24. Know the recursive definition of determinants
25. Make use of the properties of determinants in their calculations
26. Find eigenvalues and eigenvectors of square matrices
27. Diagonalize square matrices, whenever possible
28. Compute the matrix of a linear transformation relative to given bases
29. Compute the inner product of vectors, lengths of vectors, and determine if vectors are orthogonal
30. Know what is meant by an orthogonal set, orthogonal basis and orthogonal matrix
31. Find the orthogonal projection of a vector onto a subspace
32. Find an orthogonal basis using the Gram-Schmidt process
33. Determine the least-squares solutions of linear systems
34. Orthogonally diagonalize symmetric matrices
35. Know how to eliminate cross-product terms in quadratic forms.