# Montgomery College
# MA 284 Course Outcomes
*Approved Spring 2008*

| # | *Outcome: Upon completion of this course/program a student will be able to:* |
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| 1. | Determine whether solutions of a linear system $Ax = b$ exist. If so, determine whether the solution is unique and find a basis for the solution space. |
| 2. | Explain what it means for a set of vectors to be a subspace of $R^n$. Verify that a given set does or does not satisfy the defining properties of a subspace. |
| 3. | Demonstrate an understanding of the concepts of linear independence, spanning, and basis. Determine whether a given set of vectors is linearly independent and/or spans a given subspace. Produce a basis for a given subspace of $R^n$. |
| 4. | Perform matrix calculations, applying the rules of matrix algebra. |
| 5. | Find the column space, row space, and null space of a matrix. Show an understanding of the relationship between the dimension of the null space, the rank, and the number of columns of the matrix. |
| 6. | Define what it means for a function to be a linear transformation from $R^n$ to $R^m$. Describe the kernel and range of a given linear transformation. |
| 7. | Produce the eigenvalues and associated eigenspaces for a given matrix. Explain geometrically the result of multiplying an eigenvector by the matrix. |
| 8. | Apply the dot product and its properties to problems of orthogonality, the magnitude of vectors, and the distance between vectors. Produce orthogonal bases of subspaces of $R^n$. |
| 9. | Use the techniques and theory of linear algebra to model various real world problems. (Possible applications include: curve fitting, computer graphics, networks, discrete dynamical systems, systems of differential equations, and least squares solutions.) |
| 10. | Effectively communicate the concepts and applications of linear algebra using the language of linear algebra in a mathematically correct way. |
| 11. | Use advanced software tools (e.g., Maple, MATLAB, Mathematica) to solve problems in linear algebra. |