**Learning Outcomes for Numerical Analysis I, MATH-62251/72251**

**Knowledge**

The course focuses on Numerical Linear Algebra, which is fundamental for most areas of Scientific Computing. Many ideas and concept of importance in applied mathematics and computation will be discussed. These include several matrix factorization methods, such as QR and LU factorization, as well as the singular value decomposition. The sensitivity of the computed results to errors in the data, as well as to round-off errors introduced during the computations, will be investigated. It is the purpose of this course to introduce state-of-the-art numerical methods and provide an understanding of their performance through analysis and application.

**Comprehension**

Students should know the matrix factorizations used in the numerical methods, how they are computed, how they can be applied, how they can be implemented in MATLAB, and how their existence can be established. Students should be able to analyze the algorithms to determine their properties.

**Application**

The methods covered in the course are applied to a variety of computational problems.

**Analysis**

Students should be able to determine properties of algorithms, including their sensitivity to errors in the data and round-off errors introduced during the computations. .

**Synthesis**

The course forces students to apply and expand knowledge gained in Calc I, Calc II, and Linear Algebra, as well as in more elementary courses on numerical methods.

**Evaluation**

Students should be able to solve problems in scientific computing by writing MATLAB code using the methods discussed in the course. Students also be able to determine properties of these methods.

**Class Activities**

Discuss the methods, show their properties, and illustrate their performance.

**Out of class Activities**

Do weekly homework assignment that involves analysis, application, and implementation in MATLAB of the methods discussed.