

Numerical Linear Algebra (MTH/CMSE 314)

Fall 2019

Course Number: CMSE 314 / MTH 314 (Enroll in MTH 314)

Title: Numerical Linear Algebra / Matrix Algebra I

Time: Tuesdays and Thursdays - 10:20 AM - 11:40 AM

Location: [1235 Anthony Hall](#)

Prerequisite: Calculus I and programming experience (ex. CMSE 201, CSE 231, EGR102).

Instructor: Dirk Colbry

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Description: This is an introductory course on Linear Algebra with a focus on scientific/engineering applications and solving large problems using computers.

Topics include:

- **Solving linear equations:** Gaussian elimination, matrix notation, transposes, inverse matrix, matrix multiplication, solve $Ax=b$, special solutions
- **Linear transformation, basis and dimension:** linear independence, four fundamental spaces
- **Orthogonality:** orthogonal vectors and spaces, projection onto linear, least square, Grams-Schmidt, QR decomposition
- **Matrix Properties:** Trace and determinant
- **Eigenvalue and eigenvector:** diagonalization, solve difference equations, Markov, stability, Singular Value Decomposition
- **Complex matrices:** Fast Fourier Transforms
- **Numerical methods for large scale problems**

Example application areas include:

- Experimental Data Curve Fitting
- Electrical Networks
- Group Relationships in Sociology
- Scientific Simulations (ex. weather prediction, fluid flow, etc.)
- Image analysis
- Robotic Manipulation

Format: This course is taught using a flipped classroom format similar to CMSE 201/202. In a flipped classroom, students watch video lectures outside of class and then work individually and in groups to solve problems during class. Class examples and assignments will be done using the Python programming language.

Questions? Contact the instructor for more information, or to obtain an enrollment override.

