**An Introduction to Linear Algebra Using Python: Part II**

Dr. Steven L. Richardson

Howard University and Harvard University

Tuesdays 2:00 p.m. – 3:35 p.m. (Zoom Lecture)

Tuesdays 3:35 p.m. – 4:30 p.m. (Zoom Recitation Session)

srichards22@comcast.net

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Linear algebra can help us better understand important problems in data science like in this general example.

This course is a continuation of the course “An Introduction to Linear Algebra Using Python’’(<https://www.youtube.com/playlist?list=PL0CLfRiRFyPBIqzvtFUeG9vPQ-uVq4I-Q>) and it covers the following topics: linear transformations, orthogonal matrices, the Gram-Schmidt process, QR-decomposition, eigendecomposition, symmetric matrices, singular vectors and values, the singular value decomposition problem, covariance matrices, and an introduction to principal component analysis. NumPy (a numerical library of Python) is a very convenient package which is used to code both vectors and matrices and we will use some simple applications of it throughout this course to reinforce the important concepts and examples of linear algebra.

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**Lecture 1 (Tuesday, June 7, 2022):** Review of Properties of Vectors and Matrices: I

**Lecture 2 (Tuesday, June 14, 2022):** Review of Properties of Vectors and Matrices: II

**Lecture 3 (Tuesday, June 21, 2022):** Projections and the Gram-Schmidt Process

**Lecture 4 (Tuesday, June 28, 2022):** The QR Decomposition of Matrices

**Lecture 5 (Tuesday, July 5, 2022):** The Eigendecomposition Problem: Part I

**Lecture 6 (Tuesday, July 12, 2022):** The Eigendecomposition Problem: Part II

**Lecture 7 (Tuesday, July 19, 2022):** The Eigendecomposition Problem: Part III

**Lecture 8 (Tuesday, July 26, 2022):** The Eigendecomposition Problem: Part IV

**Lecture 9 (Tuesday, August 2, 2022):** An Introduction to the Singular Value Decomposition (SVD): Part I

**Lecture 10 (Tuesday, August 9, 2022):** An Introduction to the Singular Value Decomposition (SVD): Part II

**Lecture 11 (Tuesday, August 16, 2022):** An Introduction to the Singular Value Decomposition (SVD): Part III

**Lecture 12 (Tuesday, August 23, 2022):** Covariance Matrices

**Lecture 13 (Tuesday, August 30, 2022):** An Introduction to Principal Component Analysis (PCA)