

Introduction to Linear Algebra

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February 22, 2025

1 Course Overview

Welcome to the Introduction to Linear Algebra course. This course is designed for first-semester mathematics students and will cover essential topics in linear algebra over ten weeks. The teaching team consists of Andreas Grotto, Cordelia, and Eric Horman.

2 Course Structure

The course is organized into ten weeks of material, followed by a revision week before the final assessment. Each week will focus on a specific topic, with lectures held on Thursdays and Fridays. The course utilizes a flipped classroom model, requiring students to complete pre-reading before attending lectures.

2.1 Weekly Schedule

- **Pre-reading:** Assigned chapters from the course textbook.
- **Lectures:** Interactive sessions on Thursdays and Fridays.
- **Reading Quiz:** Online quiz on Mondays covering the previous week's material.
- **Workshops:** Held on Tuesdays, focusing on problem-solving with a tutor.
- **Assessed Quiz:** Due on Wednesdays, testing knowledge from the week's topic.

3 Course Materials

The course textbook is available online as a free PDF. Students are encouraged to read actively and engage with the material to prepare for lectures.

4 Assessment Structure

The course assessment consists of:

- **Weekly Quizzes:** 40% of the final grade, with the best eight quizzes counted.
- **Hand-in Assessments:** Four assignments worth 30% of the final grade.

- **Final Assessment:** A comprehensive online quiz covering all course material, worth 30%.

To pass the course, students must achieve a weighted average of 40%.

5 Introduction to Linear Algebra

Linear algebra focuses on vectors and matrices, which are fundamental in solving linear equations. The course will explore:

- **Vector Spaces:** Understanding vectors in various contexts, including geometric and abstract representations.
- **Linear Transformations:** How linear algebra can be applied to transformations in space.
- **Eigenvalues and Eigenvectors:** Key concepts that will be explored in depth later in the course.

5.1 Applications of Linear Algebra

Linear algebra has numerous applications across various fields:

- **Computer Graphics:** Techniques like ray tracing rely heavily on linear algebra for rendering images.
- **Machine Learning:** Algorithms such as Principal Component Analysis (PCA) and Singular Value Decomposition (SVD) are based on linear algebra concepts.
- **Network Analysis:** Graphs can be represented as matrices, allowing for community detection and importance ranking of nodes.

6 Support and Resources

Students are encouraged to utilize available resources:

- **Workshops:** A great opportunity to discuss problems and deepen understanding.
- **Math Base:** A drop-in center for additional support.
- **Piazza:** An online forum for asking questions and engaging with peers.

7 Conclusion

This course aims to build a solid foundation in linear algebra, equipping students with essential skills for future mathematical studies. Students are encouraged to seek help and collaborate with peers to enhance their learning experience.