

# Proof-Based Math Readings

## Session: Matrix Algebra

### 2023 Fall

**Zeki Akyol\***

Department of Economics  
Istanbul Technical University

[Click here for the most recent versions of the syllabuses](#)

Version: 02 February 2024, 07:26 PM

## Table of contents

<b>0</b>	<b>Motivation</b>	<b>2</b>
<b>1</b>	<b>Prerequisites</b>	<b>2</b>
<b>2</b>	<b>Format</b>	<b>2</b>
<b>3</b>	<b>Resources</b>	<b>2</b>
3.1	Main Book . . . . .	2
3.2	Supplementary . . . . .	2
3.2.1	Matrix Algebra . . . . .	2
3.2.2	Proof . . . . .	2
<b>4</b>	<b>Reading Schedule</b>	<b>3</b>
<b>5</b>	<b>Further Readings (Optional)</b>	<b>3</b>






---

\*zekiakyol.com


## 0 Motivation

- *Proof-Based Math Readings* is a free and independent online reading group where we study mathematics required in economics master's/PhD programs using an intuitive approach.
- This session of the reading group is on *Matrix Algebra*.

## 1 Prerequisites

- CGPA: 3.00/4.00
-  [Book of Proof - Richard Hammack \(3.3 Edition, 2022\)](#)
-  [Linear Algebra - Gilbert Strang \(2005\)](#)
- Please use our  [Application Form](#) to join our reading group anytime.
- Applicants will be informed about their application results within a week via email.



## 2 Format

- This session will last 12 weeks.
- We will discuss the topics/exercises that we struggle with at  [Proof-Based Math Readings \[Discord\]](#).
- We will not have face-to-face/online meetings due to the size of the group.
- Members are expected to read the chapters from the main book.

## 3 Resources



### 3.1 Main Book

**Matrix Algebra - Karim M. Abadir, Jan R. Magnus (2005)** is our main book because it is well-structured and well-written.

-  [Matrix Algebra - Karim M. Abadir, Jan R. Magnus \(2005\)](#)
-  [Matrix Algebra - Karim M. Abadir, Jan R. Magnus \(2005, Errata\)](#)

### 3.2 Supplementary

#### 3.2.1 Matrix Algebra

-  [Matrix Differential Calculus with Applications in Statistics and Econometrics - Jan R. Magnus, Heinz Neudecker \(3rd Edition, 2019\)](#)
-  [Econometric Theory - William H. Greene \(\*\*Appendix A\*\*, 8th Edition, 2020\)](#)




















#### 3.2.2 Proof

In case we need to review a proof topic, we can use following book and its playlists.

-  [Book of Proof - Richard Hammack \(3.3 Edition, 2022\)](#)
-  [Book of Proof - Richard Hammack \(3.3 Edition, 2022, Companion playlist by Jeremy Teitelbaum\)](#)
-  [Book of Proof - Richard Hammack \(3.3 Edition, 2022, Companion playlist by Michael Penn\)](#)

## 4 Reading Schedule

- **MA** is the abbreviation of **Matrix Algebra - Karim M. Abadir, Jan R. Magnus (2005)**.

<b>Week 01-02</b>	 <b>23 October - 05 November</b>
 <b>MA</b> , Appendix A: Some mathematical tools  <b>MA</b> , Appendix B: Notation  <b>MA</b> , Chapter 1: Vectors  <b>MA</b> , Chapter 2: Matrices  <b>MA</b> , Chapter 4: Rank, inverse, and determinant	
<b>Week 03-04</b>	 <b>06 November - 19 November</b>
 <b>MA</b> , Chapter 5: Partitioned matrices  <b>MA</b> , Chapter 6: Systems of equations	
<b>Week 05-06</b>	 <b>20 November - 03 December</b>
 <b>MA</b> , Chapter 7: Eigenvalues, eigenvectors, and factorizations  <b>MA</b> , Chapter 8: Positive (semi)definite and idempotent matrices	
<b>Week 07-08-09</b>	 <b>04 December - 24 December</b>
 <b>MA</b> , Chapter 10: Kronecker product, vec-operator, and Moore-Penrose inverse  <b>MA</b> , Chapter 11: Patterned matrices: commutation- and duplication matrix	
<b>Week 10-11-12</b>	 <b>25 December - 14 January</b>
 <b>MA</b> , Chapter 12: Matrix inequalities  <b>MA</b> , Chapter 13: Matrix calculus  <b>MA</b> , Chapter 3: Vector spaces (Optional)	

## 5 Further Readings (Optional)

You can check out our Linear Algebra syllabus at  [github.com/zekiakyol/proof-based-math-readings](https://github.com/zekiakyol/proof-based-math-readings)