

# Proof-Based Math Readings

## Session: Optimization

2025 Spring

**Zeki Akyol\***

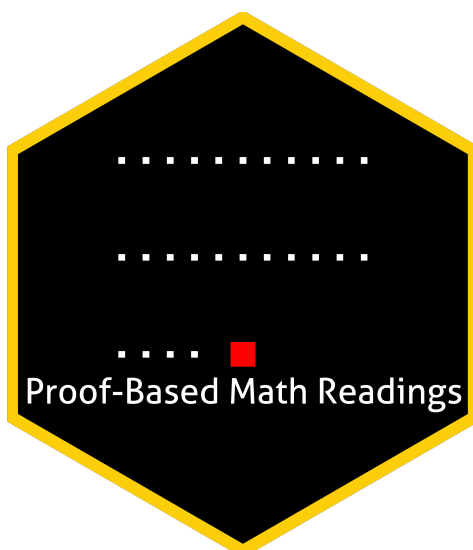
Department of Economics  
Istanbul Technical University

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\*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 *Optimization*.

## 1 Prerequisites

- CGPA: 3.00/4.00.
- Proof resources below are the prerequisites for this session.
- Please use the [🔗 Application Form](#) to join our reading group anytime.
- Applicants are informed about their application results within a week via email.

## 2 Format

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

## 3 Resources

### 3.1 Main Book and Main Book's Playlist

**A First Course in Optimization Theory** by Rangarajan K. Sundaram is our main book because it is well-written and well-structured.

📖 A First Course in Optimization Theory - Rangarajan K. Sundaram (1996)

### 3.2 Supplementary

#### 3.2.1 Proof

📖 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)

#### 3.2.2 Real Analysis











📖 Basic Analysis I: Introduction to Real Analysis [Volume I] - Jiri Lebl (Version 6.0, 2023)

🎥 Real Analysis - Casey Rodriguez (2020, Companion playlist to Basic Analysis I)

🎥 Introduction To Metric Spaces - Paige Bright (2023)

## 4 Reading Schedule

AFCOT is the abbreviation of **A First Course in Optimization Theory** - Rangarajan K. Sundaram (1996).

 <b>AFCOT</b>	<b>Week 01-02</b> 
Appendix A: Set Theory and Logic: An Introduction Appendix B: The Real Line Appendix C: Structures on Vector Spaces Chapter 1: Mathematical Preliminaries	
 <b>AFCOT</b>	<b>Week 03-04</b> 
Chapter 2: Optimization in $\mathbb{R}^n$	
 <b>AFCOT</b>	<b>Week 05-06</b> 
Chapter 3: Existence of Solutions: The Weierstrass Theorem Chapter 4: Unconstrained Optima	
 <b>AFCOT</b>	<b>Week 07-08-09</b> 
Chapter 5: Equality Constraints and the Theorem of Lagrange Chapter 6: Inequality Constraints and the Theorem of Kuhn and Tucker	
 <b>AFCOT</b>	<b>Week 10-11-12</b> 
Chapter 7: Convex Structures in Optimization Theory Chapter 8: Quasi-Convexity and Optimization	