

# Proof-Based Math Readings

## Session: Optimization\*

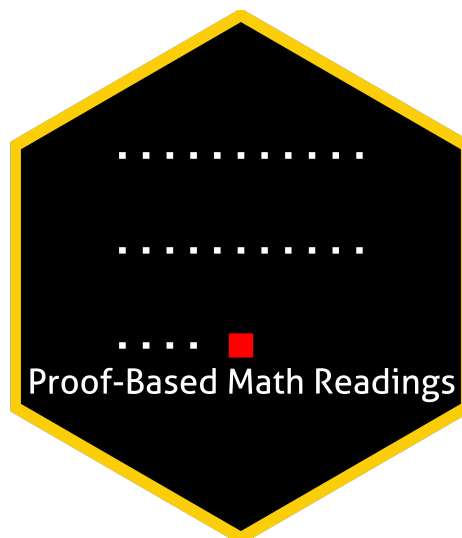
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Version: 27 June 2025, 03:26 PM

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## 0 Motivation

- *Proof-Based Math Readings* is a free, independent online reading group where we study the mathematics required for economics master's and PhD programs through an intuitive approach. Active since May 2023.
- This session of the reading group is on *Optimization*.

## 1 Prerequisites

- Proof Techniques resources below.
- Please use the  **Application Form** to join our reading group; you will receive a response within a week.




## 2 Format

- This session takes 12 weeks. We do not have face-to-face/online meetings due to the size of the group.
- Members read the main book and discuss the topics/exercises in the Proof-Based Math Readings Discord .

## 3 Resources

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

**A First Course in Optimization Theory - Rangarajan K. Sundaram (1996)** is our main book because it is well-written and well-structured.

-  A First Course in Optimization Theory - Rangarajan K. Sundaram (1996)
-  A First Course in Optimization Theory - Rangarajan K. Sundaram (1996, Solutions by Frederick Robinson)
-  A First Course in Optimization Theory - Rangarajan K. Sundaram (1996, Solutions by Paolo Pin)

### 3.2 Supplementary

#### 3.2.1 Optimization

-  Foundations for Optimization - Mark Walker (2020)
-  Optimization - Mark Walker (2020)

#### 3.2.2 Proof Techniques











-  Book of Proof - Richard Hammack (3.4 Edition, 2025)
-  Book of Proof - Richard Hammack (3.4 Edition, 2025, Playlist by Jeremy Teitelbaum)
-  Book of Proof - Richard Hammack (3.4 Edition, 2025, Playlist by Michael Penn)

#### 3.2.3 Real Analysis



-  Basic Analysis I: Introduction to Real Analysis - Jiri Lebl (Version 6.2, 2025)
-  Basic Analysis I: Introduction to Real Analysis - Jiri Lebl (Version 6.2, 2025, Playlist by Casey Rodriguez)
-  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	

## 5 Further Readings (Optional)

 Optimization by Vector Space Methods - David G. Luenberger (1997)
 <a href="#">Optimization by Vector Space Methods - David G. Luenberger (1997, Playlist by Peter Galbacs)</a>