

# Proof-Based Math Readings

## Session: Measure Theory

### 2025 Summer

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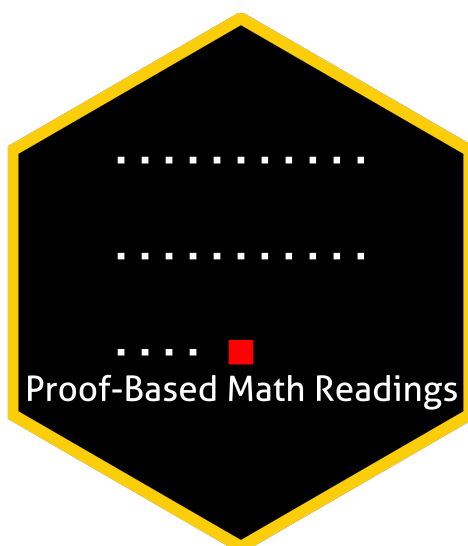
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## 0 Motivation

- *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 *Measure Theory*.

## 1 Prerequisites

- CGPA: 3.00/4.00.
- Proof, Real Analysis, and Topology 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, and watch the chapter videos from the book's playlist.

## 3 Resources

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

**Measure, Integration & Real Analysis** by Sheldon Axler is our main book for this session because it is well-written, well-structured, and open-access.




-  [Measure, Integration & Real Analysis - Sheldon Axler \(2023, Errata-free version\)](#)
-  [Measure, Integration & Real Analysis - Sheldon Axler \(2023\)](#) → will be added after the 2nd edition.

### 3.2 Supplementary

#### 3.2.1 Measure Theory

-  [Measure Theory - The Bright Side of Mathematics \(2024\)](#)
-  [Measure Theory - Indrava Roy \(2020\)](#)





#### 3.2.2 Topology

-  [Schaum's Outline of General Topology - Seymour Lipschutz \(2011\)](#)
-  [General Topology - Bernard Badzioch \(2020\)](#)
-  [Topology - Bruno Zimmermann \(2016, Video 1-15\)](#)

#### 3.2.3 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 \(3.3 Edition, 2022, Companion playlist by Michael Penn\)](#)


#### 3.2.4 Real Analysis

-  [Measure, Integration & Real Analysis - Sheldon Axler \(2023, Supplement\)](#)
-  [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


- MIRA is the abbreviation of **Measure, Integration & Real Analysis** - Sheldon Axler (2023).

### MIRA, Chapter 1: Riemann Integration

Week 01 


- 1A Review: Riemann Integral
- 1B Riemann Integral Is Not Good Enough

### MIRA, Chapter 2: Measures

Week 02-03-04-05 


- 2A Outer Measure on  $\mathbf{R}$
- 2B Measurable Spaces and Functions
- 2C Measures and Their Properties
- 2D Lebesgue Measure
- 2E Convergence of Measurable Functions

### MIRA, Chapter 3: Integration

Week 06-07-08 


- 3A Integration with Respect to a Measure
- 3B Limits of Integrals & Integrals of Limits

### MIRA, Chapter 4: Differentiation

Week 09 

- 4A Hardy–Littlewood Maximal Function
- 4B Derivatives of Integrals

### MIRA, Chapter 5: Product Measures

Week 10-11-12 

- 5A Products of Measure Spaces
- 5B Iterated Integrals
- 5C Lebesgue Integration on  $\mathbf{R}^n$