

# Proof-Based Math Readings

## Session: Measure Theory\*

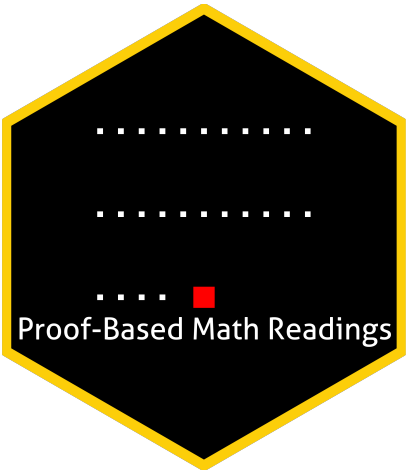
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### Table of contents

<b>0</b>	<b>Motivation</b>	<b>2</b>
<b>1</b>	<b>Prerequisites and Format</b>	<b>2</b>
<b>2</b>	<b>Resources [All are open-access]</b>	<b>2</b>
2.1	Main Book and Main Book's Playlist . . . . .	2
2.2	Supplementary . . . . .	2
2.2.1	Measure Theory . . . . .	2
2.2.2	Proof Techniques . . . . .	2
2.2.3	Real Analysis . . . . .	2
<b>3</b>	<b>Reading Schedule</b>	<b>3</b>
<b>4</b>	<b>Further Readings (Optional)</b>	<b>3</b>





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\*[zekiakyol.com](http://zekiakyol.com)

## 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 *Measure Theory*.



## 1 Prerequisites and Format

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

## 2 Resources [All are open-access]





### 2.1 Main Book and Main Book's Playlist

**Measure, Integration & Real Analysis - Sheldon Axler (2025, Errata-free version)** is our main book for this session because it is well-written, well-structured, and open-access.

-  **Measure, Integration & Real Analysis - Sheldon Axler (2025, Errata-free version)**
-  Measure, Integration & Real Analysis - Sheldon Axler (202X, Playlist) → will be added after the 2nd edition.

### 2.2 Supplementary





#### 2.2.1 Measure Theory

-  Measure Theory - The Bright Side of Mathematics (2025)
-  Measure Theory - Indrava Roy (2020)
-  A horizontal integral?! Introduction to Lebesgue Integration - vcubingx (2020)
-  The Lebesgue Integral - BBC (1975)

#### 2.2.2 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)


#### 2.2.3 Real Analysis

-  Measure, Integration & Real Analysis - Sheldon Axler (2025, Supplement)
-  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)

### 3 Reading Schedule


- MIRA is the abbreviation of **M**easure, **I**ntegration & **R**eal Analysis - Sheldon Axler (2025).

#### 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  $\mathbf{R}^n$

### 4 Further Readings (Optional)

Our Measure Theoretic Probability syllabus at  [github.com/zekiakyol/proof-based-math-readings](https://github.com/zekiakyol/proof-based-math-readings)