

Proof-Based Math Readings

Session: Measure Theory

2025 Summer

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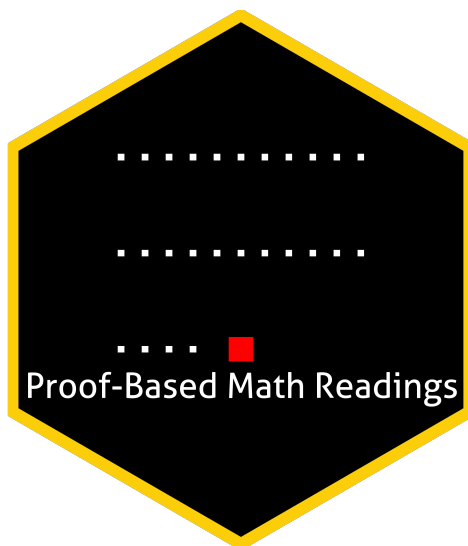
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0 Motivation

- *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.
- 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 (2024, Errata-free version)**
- ▶ **Measure, Integration & Real Analysis - Sheldon Axler (202X)** → 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, Playlist by Jeremy Teitelbaum)**
- ▶ **Book of Proof - Richard Hammack (3.3 Edition, 2022, Playlist by Michael Penn)**

3.2.4 Real Analysis

- 📖 **Measure, Integration & Real Analysis - Sheldon Axler (2024, Supplement)**
- 📖 **Basic Analysis I: Introduction to Real Analysis - Jiri Lebl (Version 6.0, 2023)**
- ▶ **Basic Analysis I: Introduction to Real Analysis - Jiri Lebl (Version 6.0, 2023, Playlist by Casey Rodriguez)**
- ▶ **Introduction To Metric Spaces - Paige Bright (2023)**

4 Reading Schedule

- MIRA is the abbreviation of **Measure, Integration & Real Analysis** - Sheldon Axler (2024).

| | |
|---|---|
|  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 | |

5 Further Readings (Optional)

You can check out our Measure Theoretic Probability syllabus at github.com/zekiakyol/proof-based-math-readings