

# Proof-Based Math Readings

## Session: Large Sample Theory\*

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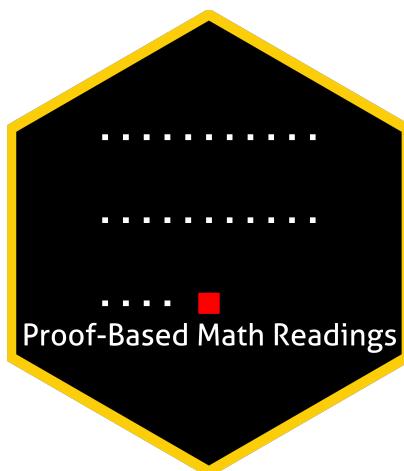
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\*[zekiakyol.com](http://zekiakyol.com)

# 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 *Large Sample Theory*.

# 1 Prerequisites and Format

- Proof Techniques and Real Analysis 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

## 2.1 Main Book and Main Book's Playlist

**Elements of Large-Sample Theory - Erich L. Lehmann (1999)** is our main book for this session because it is well-written and well-structured.

Jingyi Jessica Li's playlist is our main playlist because her narrative is great.

- ❑ Elements of Large-Sample Theory - Erich L. Lehmann (1999) → Easier but doesn't contain solutions
- ❑ Elements of Large-Sample Theory - Erich L. Lehmann (1999, Errata)
- ❑ A Course in Large Sample Theory - Thomas S. Ferguson (2002) → Harder but contains solutions
- ❑ A Course in Large Sample Theory - Thomas S. Ferguson (2002, Errata)
- ❑ A Course in Large Sample Theory - Thomas S. Ferguson (2002, Playlist by Jingyi Jessica Li)
- ❑ A Course in Large Sample Theory - Thomas S. Ferguson (2002, Notes by Jingyi Jessica Li)

## 2.2 Supplementary

### 2.2.1 Large-Sample Theory

- ❑ Notes for a Graduate-Level Course in Asymptotics for Statisticians - David R. Hunter (2025)
- ❑ Understanding Convergence Concepts: A Visual-Minded and Graphical Simulation-Based Approach - P. Micheaux, B. Liquet (2009)

### 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

- ❑ Basic Analysis I: Introduction to Real Analysis - Jiri Lebl (Version 6.3, 2026)
- ❑ Basic Analysis I: Introduction to Real Analysis - Jiri Lebl (Version 6.3, 2026, Playlist by Casey Rodriguez)
- ❑ Introduction To Metric Spaces - Paige Bright (2023)

### 3 Reading Schedule

- ELST is the abbreviation of Elements of Large-Sample Theory - Erich L. Lehmann (1999).

<b>ELST, Chapter 1: Mathematical Background</b>	Week 01-02	
<b>1.1</b> The concept of limit <b>1.2</b> Embedding sequences <b>1.3</b> Infinite series <b>1.4</b> Order relations and rates of convergence <b>1.5</b> Continuity <b>1.6</b> Distributions		
<b>ELST, Chapter 2: Convergence in Probability and in Law</b>	Week 03-04-05-06	
<b>2.1</b> Convergence in probability <b>2.2</b> Applications <b>2.3</b> Convergence in law <b>2.4</b> The central limit theorem <b>2.5</b> Taylor's theorem and the delta method <b>2.6</b> Uniform convergence <b>2.7</b> The CLT for independent non-identical random variables <b>2.8</b> Central limit theorem for dependent variables		
<b>ELST, Chapter 3: Performance of Statistical Tests</b>	Week 07-08-09	
<b>3.1</b> Critical values <b>3.2</b> Comparing two treatments <b>3.3</b> Power and sample size <b>3.4</b> Comparison of tests: Relative efficiency <b>3.5</b> Robustness		
<b>ELST, Chapter 4: Estimation</b>	Week 10-11-12	
<b>4.1</b> Confidence intervals <b>4.2</b> Accuracy of point estimators <b>4.3</b> Comparing estimators <b>4.4</b> Sampling from a finite population		

### 4 Further Readings (Optional)

**Asymptotic Theory for Econometricians** - Halbert White (Revised Edition, 2000)