Operational Math
DoSS Summer Prep Bootcamp 2022

1 Time & Place

July 11 to 26, online

2 Instructor

Emma Kroell, 2nd year PhD student, Department of Statistical Sciences

3 Course Outline

Review of proof techniques. Selected topics in linear algebra, real analysis and topology.

4 Textbooks

The following books are optional texts for the different areas we will cover. All books are freely available online, however some require a U of T log-in.

Proofs:

1. *An Introduction to Mathematical Structures and Proofs* by Larry J. Gerstein

Set theory and topology:

2. *A Taste of Topology* by Volker Runde

Linear algebra:

3. *Linear Algebra Done Right* by Sheldon Axler
4. *Linear Algebra Done Wrong* by Sergei Treil

Analysis:

5. *Introduction to Real Analysis* by William F. Trench
6. *Understanding Analysis* by Stephen Abbott
7. *Real Mathematical Analysis* by Charles C. Pugh

Additional resources:

8. *Lecture notes in Mathematics for Economics and Statistics* by Piotr Zwiernik
9. *Real Analysis Lecture Notes* by Laurent Marcoux
   Real Analysis Lecture Notes by Ken Davidson
   Functional Analysis Lecture Notes by Ken Davidson

5 Tentative Lecture Schedule

The lecture topics and corresponding chapters in the texts (if applicable) are outlined below. This schedule is tentative and will inevitably be augmented during the course.

Lecture	Topics	References
1	Review of logic & proof techniques	1
2	Set theory	2, 8, 9
3	Linear algebra I	2 & 3
4	Linear algebra II	2 & 3
5	Linear algebra III	2 & 3
6	Metric spaces and sequences I	4, 5, 6
7	Metric spaces and sequences II	4, 5, 6, 7 (ch. 2)
8	Topology	7 (ch. 3 & 4)
9	Differentiation and integration	4, 5, 6
10	Multivariable calculus	4, 5, 6