Operational Math

DoSS Summer Prep Bootcamp 2022

1 Time & Place

TBD

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

Linear algebra:

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

Analysis:

4. *Introduction to Real Analysis* by William F. Trench
5. *Understanding Analysis* by Stephen Abbott
6. *Real Mathematical Analysis* by Charles C. Pugh
7. *A Taste of Topology* by Volker Runde

Additional resources:

Lecture notes in Mathematics for Economics and Statistics by Piotr Zwiernik
Real Analysis Lecture Notes by Ken Davidson
Real Analysis Lecture Notes by Laurent Marcoux
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	Linear algebra I	2 & 3
3	Linear algebra II	2 & 3
4	Linear algebra III	2 & 3
5	Set theory	7 (ch. 1)
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