

# Elchanan Solomon

yitzchak.solomon@duke.edu | [linkedin.com/in/elchanan-solomon](https://www.linkedin.com/in/elchanan-solomon) | [elchanansolomon.com](http://elchanansolomon.com)

I am a mathematician working in applied topology and geometry. I'm interested in stability and inverse properties of topological transforms, connections between applied topology and metric geometry, optimization and learning with topological invariants, and their applications to data science.

## CURRENT POSITION

---

### Duke University

*Phillip Griffiths Assistant Research Professor in Mathematics*

Durham, NC

2019-

## EDUCATION

---

### Brown University

*PhD. in Mathematics*

Providence, RI

2013-2019

### UCLA

*B.S. and M.A. in Mathematics, Regents Scholar*

Los Angeles, CA

2010-2013

## PUBLICATIONS & PREPRINTS

---

### From Geometry to Topology: Inverse Theorems for Distributed Persistence

(joint with Alex Wagner and Paul Bendich)

2021

### A Fast and Robust Method for Global Topological Functional Optimization

(joint with Alex Wagner and Paul Bendich)

2020

### Geometric Fusion via Joint Delay Embeddings

(joint with Paul Bendich)

2020

- Published in Fusion 2020 Conference Proceedings.
- Won 2nd runner up in the general category of the Fusion 2020 Best Paper Award.

### Intrinsic Topological Transforms via the Distance Kernel Embedding

(joint with Clément Maria and Steve Oudot)

2019

- Accepted to SOCG 2020.

### Inverse Problems in Topological Persistence

(joint with Steve Oudot)

2018

- Published in Proceedings of the Abel Symposium.

### Barcode Embeddings for Metric Graphs

(joint with Steve Oudot)

2017

- Published in Algebraic and Geometric Topology.

### Relaxing the Integral Test: A Challenge for the Advanced Calculus Student

(joint with Paul Carter)

2017

- Published in College Mathematics Journal.

## CONFERENCES AND SEMINARS

---

### Applied Algebraic Topology Research Network (AATRAN)

(co-organizer with Henry Adams and Sara Kališnik)

2020-

### Brown Applied Topology and Geometry Seminar

(co-organized with Melissa McGuirl)

2018-2019

### TRIPODS Summer Bootcamp: Topology and Machine Learning (ICERM)

(on the organizing committee)

2018

## TEACHING

---

**Duke:** Math 466 (Math of Machine Learning), Math 216 (Linear Algebra and Differential Equations).

**Duke Kunshan University:** Stats 302 (Principles of Machine Learning), Math 202 (Linear Algebra).

**ICERM:** TA for Summer@ICERM REU in Applied Topology.

**Brown:** Math 1620 (Mathematical Statistics and Data Science), Math 200 (Multivariable Calculus), DATA 1010 TA (Data Science Probability and Statistics), Math 520 (Linear Algebra), Summer@Brown Combinatorics TA, Math 202 (Linear Algebra), Math 90 TA (Calculus), Math 2410 TA (Algebraic Topology).

**UCLA:** Docent at UCLA Math Circle.

## MENTORING

---

**Duke:** Capstone Project Manager for Duke Masters in Data Science (MIDS).

**Brown:** Mentor for two students in the Directed Reading Program (Algebraic Topology, Differential Topology). Sponsor for Undergraduate Independent Study in Model Theory.

## SKILLS

---

**Coding:** Python (including numpy, scipy, matplotlib, pandas, tensorflow, gudhi) and L<sup>A</sup>T<sub>E</sub>X. Past experience with C++, Java, and MATLAB.

**Languages:** English (native), Hebrew (fluent), Spanish (proficient), Catalan (proficient), French (intermediate), Yiddish (intermediate), Mandarin (intermediate), Russian (elementary).