Hunter Vallejos

Curriculum Vitae

"There are no uninteresting things, only uninterested people."
– G. K. Chesterton

Education

2019–2024 **Ph. D. Mathematics**, *University of Texas at Austin*, In progress
Advisor: Lewis Bowen

2015–2019 **B. S. Mathematics**, *Georgia Institute of Technology*, Summa cum Laude
Concentration in Pure Math

Research interests

Random geometric structures on surfaces; Teichmüller theory; ergodic theory.

Talks

Formal Talks

Spring 2023 **Random quasi-Fuchsian structures on surfaces**, *University of Texas at Austin*, Majors' Seminar, Texas Undergraduate Groups and Dynamics Conference

Billards, translation surfaces, and introduction to ergodic theory, *Trinity University*, Majors' Seminar

Summer 2022 **Local limits of high genus translation surfaces**, *Texas A&M*, Graduate student concentration week on metric geometry

Spring 2022 **Benjamini-Schramm limits of high genus translation surfaces**, *University of Texas at Austin*, UT Groups & Dynamics Seminar
Candidacy exam

Informal Talks

Spring 2023 **Counting curves on hyperbolic surfaces**, *UT Austin*, Jr. Topology Seminar

Fall 2022 **Introduction to complex-analytic Teichmüller theory**, *UT Austin*, Jr. Topology Seminar

Introduction to hyperbolic geometry, *UT Austin*, UT Math Club

Spring 2022 **R-trees as limits of G-spaces**, *UT Austin*, GGT Learning Seminar

Introduction to Siegel-Veech constants, *UT Austin*, Jr. Topology Seminar

Fall 2021 **Billiard flow and introduction to ergodic theory**, *UT Austin*, UT Math Club

Introduction to CAT(0) spaces, *UT Austin*, GGT Learning Seminar

hunterandresvallejos@utexas.edu

Spring 2021 **The planar stochastic hyperbolic triangulation**, *UT Austin*, Jr. Probability Seminar

Randomly sampling half-translation surfaces, *UT Austin*, Jr. Geometry Seminar

Thurston's homeomorphism and an application to earthquake flow, *UT Austin*, Jr. Topology Seminar

The Alexander Method, *UT Austin*, Mapping Class Group Learning Seminar

Fall 2020 **Translation Surface Basics**, *UT Austin*, Jr. Topology Seminar

Fall 2019 **Conway's game of sprouts**, *UT Austin*, Sophex Seminar

An introduction to Legendrian knot theory, *UT Austin*, Jr. Topology Seminar

TREE(3) and other big numbers, *UT Austin*, Supervised Teaching Course

Conferences Attended

Summer 2023 **Dynamics, Rigidity, and Arithmetic in Hyperbolic Geometry**, *ICERM (Brown University)*

Graduate Mini-school in Groups, Dynamics, and Probability, *University of Texas at Austin*

Spring 2023 **Texas Undergraduate Groups and Dynamics Conference**, *University of Texas at Austin*

SaltFlat: MRC in Teichmüller dynamics, *University of Utah*

Fall 2022 **Nearly carbon neutral geometric topology conference**, *Online*

Summer 2022 **Graduate student concentration week on metric geometry**, *Texas A&M*

Graduate Mini-school in Groups and Dynamics, *University of Texas at Austin*

Teaching Experience

University of Texas at Austin

2020–2024 **Teaching Assistant Positions**

Holding recitations, office hours, and grading.

Fall 2022	Probability I (M 362K); two sections
Spring 2022	Introduction to Dynamical Systems (M 375T)
Fall 2021	Differential Equations with Linear Algebra (M 427J)
Spring 2021	Real Analysis I (M 365C); two sections
Fall 2020	Advanced Calculus for Applications (M 427L)

2022-2024 **Summer mini-courses**

Week long (5 lectures) mini-courses held at UT Austin.

- Introduction to Classical Ergodic Theory; Summer 2022. Class was open to anyone, with about 10 of the attendees outside of UT Austin. Topics covered: the basics of probability-measure-preserving actions of the integers and the classical Von Neumann, Birkhoff, and unique ergodic theorems.
- Algebraic Topology Bootcamp; Summer 2022. A refresher for other UT Austin graduate students intent on passing the algebraic topology preliminary exam at UT Austin. Topics covered: the fundamental group, covering spaces, singular and cellular homology, and fixed point theorems.

2021–2024 **Sanger MRR Graduate Instructor**

Running refreshers and reviews before exams for math classes through the Sanger Learning Center at UT Austin. Reviews were for all sections of a class that semester.

Fall 2022 Integral Calculus (M 408L)

Fall 2021 Differential Calculus (M 408K)

2019-2024 **Directed Reading Program**

RTG program of the Department of Mathematics at the University of Texas at Austin. DRP pairs undergraduate students with graduate student mentors to undertake independent projects in mathematics. Below is a list of topics covered with various students.

Fall 2022	Complex analysis and the Laplace transform w/ Keija
	Classical ergodic theory w/ Jacob
Summer 2022	Cellular automata, Turing machines, and shift spaces w/ Joe
Spring 2022	Covering spaces and the fundamental group w/ Luke
	The Elgamal public key cryptosystem w/ Keija
Fall 2021	Principle components analysis and other methods w/ Kyle
	Random walk on groups and graphs w/ Yijie
Summer 2021	Classical ergodic theorems and Benford's law w/ Kyle
Spring 2021	The universal approximation theorem for neural networks w/ Jacob
	Mixing times of Markov chains and card shuffling w/ Kyle
Fall 2020	Differential privacy w/ Maruth
	Measurability w/ Jerry
Spring 2020	The fundamental group w/ Chuxuan
Fall 2019	Cantor dust which "blocks out the sun" w/ Ben

2022-2024 **Professional Private Tutoring**

Tutoring in a wide swath of subjects, including:

- high school geometry and algebra
- all levels of calculus
- discrete mathematics and combinatorics
- undergraduate level real and complex analysis
- abstract algebra
- functional analysis
- measure theory
- probability theory
- differential topology
- symplectic geometry

Some tutoring involved specialized topics for other graduate students in subjects such as the Painlevé equations and singularity theory.

Georgia Institute of Technology

2016–2018 **Teaching Assistant Positions**

Holding recitations, office hours, and grading. The linear algebra classes in Fall 2017 & Fall 2018 were live-streamed to dual-enrollment students at various high schools in Georgia. The Calculus survey in Summer 2018 was part of the Office of Minorities and Diversity Challenge Camp for incoming 1st-years at Georgia Tech.

Fall 2018	Linear Algebra (MATH 1554)
Summer 2018	Calculus Survey (MATH 1000)
Spring 2018	Multi-Variable Calculus (MATH 2550)
Fall 2017	Linear Algebra (MATH 1554)
Spring 2017	Linear Algebra (MATH 1553); two sections
Fall 2016	Linear Algebra (MATH 1554)

Awards & Honors

2019 **Dean's Strategic Fellowship**, *University of Texas at Austin*

President's Undergraduate Research Award, *Georgia Institute of Technology*

2018 **Research Ambassador**, *Georgia Institute of Technology*

Outstanding Math Major Award, *Georgia Institute of Technology*

2015 **Honor's Program**, *Georgia Institute of Technology*

Provost Scholarship, *Georgia Institute of Technology*

National AP Scholar, *College Board*

Publications

2018 **An agent based model of the observed distribution of wealth in the United States**, *Springer; Society for Economic Science with Heterogeneous Interacting Agents*, Volume 13(3), pages 641-656

with James J. Nutaro and Kalyan S. Perumalla at Oak Ridge National Laboratory

Posters

2018 **Polynomial contact homology on Legendrian knots**, *Undergraduate Research Symposium*, Georgia Institute of Technology

Stable tame isomorphisms of Legendrian knots, *Summer REU*, Georgia Institute of Technology

with Devon Ingram and under the mentorship of Caitlin Leverson

2017 **Augmentations of Legendrian knots**, *Summer REU*, Georgia Institute of Technology

under the mentorship of Caitlin Leverson

2016 **An agent-based model of the exponential-Pareto distribution of wealth**, *HERE Internship*, Oak Ridge National Laboratory

under the mentorship of James Nutaro

2015 **Qualifying the forecast accuracy of artificial neural networks on the stock market**, *RAMS Internship*, Oak Ridge National Laboratory

under the mentorship of James Nutaro

1/f power spectra and fractals in the heart: a pedagogic view, *High school math thesis*, Joint Oak Ridge high school – Oak Ridge National Laboratory
under the mentorship of Richard Ward

Service

2023 **Volunteer for Graduate Mini-school in Groups, Dynamics, and Probability Conference**, *UT Austin*

Volunteer for inaugural Undergraduate Groups and Dynamics Conference, *UT Austin*

2022 **Established Jr. Groups & Dynamics Seminar at UT Austin**
with Erin Bevilacqua

Organizer for Jr. Topology Seminar, *UT Austin*

2020-2021 **Served on inaugural Graduate Student Committee for the Math Department**, *UT Austin*