Austin Laine

225 Ramsay St, San Marcos, TX 78666 ● 832.316.4350 ● ajl196@txstate.edu

EDUCATION

B.S. in Math, Minors in Computer Science and Physics,
Texas State University, San Marcos, Texas
M.S. in Math, Expected Graduation Spring 2026
Texas State University, San Marcos, Texas

AWARDS AND FELLOWSHIPS

Logic at Texas State Fellowship, Texas State University 2022 – present
MathWorks Fellow, Texas State University 2022 – 2023
Dean's List, Texas State University 2021
Most Distinguished Speaker, Talk Math 2 Me 2024
Elite Match Sprint State Champion 2018
4-time Junior National Medalist Track Cycling 2015 – 2018

TEACHING EXPERIENCE

Tutor Mathcats, Texas State University, San Marcos, TX Fall 2023
Tutor all levels of undergraduate math offered at Texas State University
This includes Topology, Analysis I&II and Modern Algebra

MathWorks Fellow, Texas State University, San Marcos, TX 2022 - 2023
Taught summer of 2022 and 2023
In 2022 I taught level 4 which included topics in Set Theory and probability
This year I taught level 5 which included a wide variety of topics usually not seen till university

RESEARCH EXPERIENCE/READING COURSES

Texas State University, San Marcos, TX 2022 - Present

Reading Courses: Along with weekly meetings with Dr. Boney, I read through and did problems out of "A Mathematical Introduction to Logic" by Herbert Enderton. Here I learned about Model theory and the background needed to understand early first order logic results such as the incompleteness theorems.

Also, with Dr. Boney I worked through "Category Theory" by Steve Awodey. Here I learned about what Category's are with a focus on understanding Functors as a part of a research project.

In addition, we have discussed many topics in logic including Set Theory, 2nd order/Higher order logic, Type Theory and many others.

2022 – Present

Research projects: I helped referee a paper in Algebraic Topology with Dr. Chase.

With Dr. Boney we have a couple of ongoing projects one in the application of Concrete Functors to Model theory and another in applying Topology to Model theory

I co-run a learning seminar for Logic@TXST. We meet bi-weekly in public form and discuss the research of the fellows in the program. As part of this I also hold office hours and serve as a mentor for the undergraduates in the program.

PRESENTATIONS

"Cardinality with ZFC: An Introduction to Infinity with Sets", Talk Math to Me, 2022

I introduced the audience to cardinality using the ZFC axioms. Including a proof of Cantors theorem, and a discussion of building ordinals.

"What is a Model?" Talk Math 2 Me, 2023.

I introduced the audience to the definition of a model. First through careful definition and then through motivating examples. I then introduced several powerful theorems from first-order model theory.

"Ultraproducts" Talk Math 2 Me, 2024.

I presented the definition of an ultraproduct. A construction that requires an understanding of models, ultrafilters, products, and quotients. I took the audience through explanation of each before bringing it together for the definition of an ultraproduct.

"Computing Freyd's functor", AMS sectional, 2024.

I presented my ongoing research project on concrete functors. Concrete functors are faithful functors to the category of sets and functions. Freyd showed that there is a necessary and sufficient condition for concreteness called Isbell condition. In this presentation I showed the construction of this proof and discussed how my project aims to compute explicit concrete functors.

COMPUTER/TECHNICAL SKILLS

C++, R, Python, LaTeX

Narrative

I have experience at many different levels as an educator. As part of mathworks I have worked at the K-12 level by helping facilitate original thought in the problem solving prosses for the campers. In presenting at Talk Math 2 Me I have show the ability to present complex material in a public setting winning the "Most Distinguished Speaker" award. As a graduate assistant for Logic@TXST I have helped build an environment for fellows to present new material and add commentary on what they studied.

As an undergrad at Texas State, I always wanted to do research in math. While taking intro to advanced math with Dr. Chase I got exposed to the IBL class format. This opened the door for me to develop my proof writing skills and exposed me to the idea that being a good instructor is about more than providing good explanation. In particular, Dr. Chase showed the value in facilitating student inquiry and providing support to student thinking. I took Topology with Dr. Chase in the same format and began helping referee a paper in algebraic topology. This gave me exposure to the world publication and the challenges in understanding research math.

I met my advisor Dr. Boney at an expo for the graduate math department. I had a prior curiosity for logic so learning there is a Logician on campus sparked my interest. We started meeting regularly to go over readings and discuss new concepts. This led to a paid position as a fellow working to learn more mathematical logic. This has given me a unique perspective both in math and in education by giving me the tools to learn deep material with minimal guidance. Now as a graduate student I mentor undergraduate fellows in much the same way.

Over time I have gained skills as a specker and views as an educator. In each of my talks I have worked to improve the quality of an exposition. To me this is less about delivering more information and more about providing a medium for the audience to engage with the topic at hand. This view has extended to my teaching. The difference being that in a class setting there is time to do more than just have the audience engage in thought but to actual learn the material. At all levels I see myself as a facilitator for student learning. I don't feel that I hold the keys to knowledge and that in the right environment students can reach their own correct understanding of material. In this way I go out of my way to provide this environment and to approach student questions with an open mind.