Aislinn E. Smith

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EDUCATION

University of Texas at Austin – College of Natural Sciences

Overall GPA: 3.9/4.0

Bachelor of Science - Mathematics

Certificate Program: Scientific Computation and Data Sciences

Master of Arts - Mathematics - *Current Degree Program*

RESEARCH/PROJECTS

Mathematics MA Thesis: *"The Nielsen-Realization Problem in Dimensions 2-4"*   ***Aug. 2025***

- In progress

Max Planck Institute for Math in the Natural Sciences - Guest Researcher   ***June 2023 - July 2024***

- Led a remote reading course focused on Riemann surfaces and complex algebraic geometry with a survey of other topics including Deligne-Mumford compactification, Teichmuller space, and mapping class groups.
- Attended in-person summer lecture series on ergodic theory and character varieties

Mathematics BSc Thesis: "*Minimal surfaces in hyperbolic manifolds and link complements*"   ***Dec. 2022***

- Advised by Prof. John Luecke
- The project is motivated by REU research, specifically on the topic of geodesics formed by horocyclic edges within minimal surfaces of hyperbolic manifolds with parabolic cusps.

SUMRY REU – Yale U. : "*Combinatorial and geometric aspects of hyperbolic manifolds*"   ***May 2022 - July 2022***

- Undergraduate NSF-funded research in low dimensional topology and combinatorial hyperbolic geometry mentored by Dr. Franco Vargas-Pallete
- Project was motivated by the converging interests of Karen Uhlenbeck and William Thurston on closed geodesics within hyperbolic surfaces of constant mean curvature.
- One of my contributions was the development of a finite element method that could simulate mean curvature flow such that it was compatible with a hyperbolic metric.

Moncrief Internship w/ The UT ODEN Institute for Computational Sciences   ***May 2021 - May 2022***

- Developed mathematical models/algorithms using principles of stochastic path integral control to aid automated vehicles in avoiding obstacles with a degree of randomized motion and varying levels of allowed risk under advisement of Dr. Takashi Tanaka
- Compared the computational complexity and success of two different models of diffusion-based optimal control. One of which used reinforcement learning and a weighted average of randomly sampled trajectories, while the second method numerically found solutions to the Hamilton-Jacobi-Bellman differential equation

NSF RTG Undergraduate fellowship w/ UT Analysis and PDEs group   ***Aug. 2020 - May 2022***

- Independent research project guided by Dr. Stefania Patrizi on the topic non-local diffusion operators/the Fractional Laplacian
- Studied derivation and applications of harmonic extension of Laplacian to model energy minimization of crystal dislocations
- Took a series of three independent study courses on various topics in harmonic analysis and complex analysis following the completion of the year-long fellowship.

Complex Systems REU – University of Minnesota   ***May 2020 - July 2020***

- Undergraduate NSF-funded research in nonlinear fluid dynamics led by Dr. Arnd Scheel
- Researched the stability and resonances of non-linear Fischer KPP reaction-diffusion equations.
- The goal of this project was to use heteroclinic bifurcation analysis to explain and characterize a strange resonance pattern that occurred at the threshold of absolute and convective instability in the control parameter of the non-linear ODE.

ACADEMIC AWARDS

NSF Graduate Fellowship – Topology	*2023 - 2028*
UT Austin Dean's Strategic Fellowship	*2023 - 2028*
Nancy Francis and William Arnold McMinn Presidential Scholarship	*Aug. 2021 - May 2022*
NSF Undergraduate Research Training Grant	*Aug 2020 - May 2021*

TALKS/CONFERENCES

Combinatorial and gauge theoretical methods in low dim-topology - CRM De Giorgi   *June 2024*

Homology Growth in Topology and Group Theory - MPIM Bonn   *May 2024*

CIRM Research School - Renormalization and Visualization for Packing, Billiards, and Surfaces   *July 2023*
- Research school participant

Joint Mathematics Meeting (JMM)   *Jan. 2023*
- Presented on Yale REU research @ Pi Mu Epsilon undergraduate research forum

The Young Mathematicians Conference @ Ohio State University   *Aug. 2022*
- Presentation: *Finding the Minimal Splitting Surface of the Ideal Regular Octahedron in the Poincare Ball*

Texas Undergraduate Mathematicians Conference   *Oct. 2022*
- Presented on Yale REU research and hyperbolic geometry for early undergraduates, and spoke on panel on undergraduate research opportunities
- Presentation: *Finding the Minimal Splitting Surface of the Ideal Regular Octahedron in the Poincare Ball*

UT Austin College of Natural Sciences Research Forum   *May 2021*
- Poster presentation on work/reading done on the Fractional Laplacian during year-long fellowship with the UT Analysis and PDEs RTG

TEACHING/ WORK EXPERIENCE/SKILLS

Graduate Teaching Assistant - UT Austin Department of Mathematics	*Aug 2023 - Present*
College Math and Physics tutor - UT Austin Sanger Learning Center	*July 2019 - Dec 2021*
Math and Physics Instructor/Tutor - The Liberal Arts and Science Academy	*Aug 2020 - Dec 2021*
Undergraduate Learning Assistant - UT Austin Department of Physics	*Aug 2020 - Jan 2021*

Coding Experience: C++, Fortran, Python (SciPy), Matlab

PUBLICATIONS

[1] Avery, M., Dedina, C., Smith, A, Scheel, A. (2021). Instability in large bounded domains—branched versus unbranched resonances. Nonlinearity, 34(11), 7916–7937. https://doi.org/10.1088/1361-6544/ac2a15

[2] Patil, A., Duarte, A., Smith, A., Tanaka, T., & Bisetti, F. (2022). Chance-Constrained Stochastic Optimal Control via Path Integral and Finite Difference Methods. arXiv. https://doi.org/10.48550/arXiv.2205.00628