Aislinn E. Smith

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EDUCATION

University of Texas at Austin – College of Natural Sciences

Overall GPA: 3.91/4.0

Bachelor of Science - Mathematics *(Conferred Dec. 2022)*

Certificate Program: Scientific Computation and Data Sciences

Master of Arts - Mathematics - *Current Degree Program*

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*

TEACHING/ WORK EXPERIENCE/SKILLS

Graduate Teaching Assistant - UT Austin Department of Mathematics *Aug 2024 - Present*

- Teaching Assistant for M427J (Differential Equation and Linear Algebra), M341 (Linear Algebra), and M367K (Topology I)

Directed Reading Program Mentor - UT Austin Department of Mathematics *Dec 2024 - Present*

- Worked as a graduate mentor to a group of three undergraduate students. Together, we worked to understand the basics of abstract algebra, geometric group theory, and braid groups. The main goal of our project was to read recent publications on hierarchically hyperbolic groups.

College Math and Physics Tutor - UT Austin Sanger Learning Center *July 2019 - Dec 2021*

- Employed as an math and physics tutor by UT Austin's School of Undergraduate Education, and provided 1-on-1 as well as group tutoring sessions in all levels of undergraduate math and physics

Math and Physics Instructor/Tutor - The Liberal Arts and Science Academy *Aug 2019 - Dec 2021*

- Worked as an in-person after-school tutor, and was later hired as an instructor for an online pre-calculus class

Undergraduate Learning Assistant - UT Austin Department of Physics *Aug 2020 - Jan 2021*

- Responsible for assisting a team of professors, TAs, and other Learning Assistants to teach a 200+ person section of an engineering-focused physics class

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

RESEARCH/PROJECTS

Max Planck Institute for Math in the Natural Sciences - Visiting Student ***June 2023 - July 2024***

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

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

- This 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 the 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 - UT Austin Analysis and PDEs group ***Aug. 2020 - May 2022***

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.

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*

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.

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