Aislinn E. Smith
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EDUCATION

University of Texas at Austin – College of Natural Sciences | Class of 2022
Overall GPA: 3.87/4.00
Bachelor's – Mathematics (Honors Track)
Certificate Program - Scientific Computation and Data Science

RESEARCH/ PROJECTS

Max Planck Institute for Math in the Natural Sciences - Guest Researcher Summer 2023 - Present

- Currently leading a remote inquiry-based reading course focused on Riemann surfaces and complex algebraic curves with a survey of other topics in Lie group theory, symplectic geometry, and mapping class groups.

Mathematics Honors Thesis: "*Minimal surfaces in hyperbolic manifolds and link complements*" Fall 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 University Summer 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 closed geodesics of hyperbolic surfaces within 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 Summer 2021 - Spring 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 of PDE's group Fall 2020 – Spring 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 Summer 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

CIRM Research School - Renormalization and Visualization for Packing, Billiards, and Surfaces — Summer 2023
- Research school participant

Joint Mathematics Meeting (JMM) — Winter 2023
- Presented on REU research/honors thesis project as an undergraduate speaker

The Young Mathematicians Conference @ Ohio State University — Summer 2022
- Presented on Yale REU research

GROW (Graduate Research Opportunities for Women) @ Duke University — Fall 2022

Texas Undergraduate Mathematicians Conference — Fall 2022
- Presented on Yale REU research and spoke on panel advising on undergraduate research

UT Math Directed Reading Project Presentation — Spring 2021
- Presented on the computation of homology groups of piecewise linear manifolds

UT Austin College of Natural Sciences Research Forum — Spring 2021
- Poster presentation on work done during Fellowship with Analysis and PDEs RTG

TEACHING/ WORK EXPERIENCE/SKILLS

Teaching Assistant – UT Austin Department of Mathematics — Spring 2023

UT Austin Sanger Learning Center – College Math and Physics tutor — Summer 2019 – Fall 2021

Math and Physics Instructor/Tutor @ The Liberal Arts and Science Academy — Fall 2020 – Spring 2021
- Tutored AP Physics afterschool
- Instructed inquiry-based pre-calculus course for accelerated high school students

UT Austin Undergraduate Learning Assistant — Fall 2020 & Winter 2021
- Undergraduate TA for Engineering Physics (Electricity and Magnetism)

Coding Knowledge – Fortran, C++, Python (Scipy, Pyvista), MATLAB

ACADEMIC ORGANIZATIONS/ AWARDS

2023 NSF Graduate Fellowship – Topology

UT Austin Dean's Strategic Fellowship — Fall 2023 - Spring 2028

Nancy Francis and William Arnold McMinn Presidential Scholarship — Fall 2021 - Spring 2022
- 3.5 k College of Natural Sciences departmental scholarship

NSF Undergraduate Research Training Grant — Fall 2020 - Spring 2021
- 1k research fellowship awarded through PDE's RTG

UT Dean's Scholars Honors Program — Spring 2019 - Fall 2022

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