Sara R. Wilson

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Education

University of Pittsburgh — Pittsburgh, PA
Bachelor of Science in Mathematics — Expected May 2026

Honors & Awards

Dean's List
Edna M. Heck Scholarship
SWE Scholarship & Certificate of Merit in Math and Science
Greater Pittsburgh Police FCU Scholarship

Publications

An Analysis of a 2×2 Keyfitz-Kranzer Type Balance System with Varying Generalized Chaplygin Gas — Sept 2024

J. Frew, N. Keyser, E. Kim, G. Paddock, C. Toumbleston, **S. Wilson**, C. Tsikkou
10.1063/5.0231413

Research Experience

Carnegie Mellon University — Pittsburgh, PA
CMU-Pitt Mathematics Directed Reading Program — Sept 2025 – Dec 2025

- Studied graduate-level text in computational plasma physics, investigating numerical methods, including finite difference, spectral, finite element techniques

Semiconductor Research Corporation — Tuscaloosa, AL
Engineering Researcher — Jun 2025 – Jul 2025

- Analyzed mutual and self-inductance, resonant transfer, and electromagnetic far-field behavior in one and two coil wireless power transfer systems contained in a metal enclosure
- Evaluated design modifications to optimize power via simulation, computation, and analysis

West Virginia University — Morgantown, WV
Applied Analysis Researcher — Jun 2024 – Jul 2024

- Expanded work involving a 2×2 Keyfitz-Kranzer type balance system with varying Chaplygin gas, a model for dark energy and dark matter
- Utilized numerical methods, particularly the local Lax-Friedrich scheme, adapting the implementation for time-dependent wave speeds and analyzing system dynamics, verifying delta-shocks and regional changes over time

Relevant Coursework

Graduate
Finite Element Method, Computational Fluid Dynamics, Data Science, Statistical Learning, Modeling, and Prediction, Advanced Calculus

Undergraduate
Numerical Analysis, Numerical Linear Algebra, Real Analysis, Partial Differential Equations, Ordinary Differential Equations, Linear Algebra, Abstract Algebra, Logic & Model Theory, Graph Theory, Probability, Statistics, Honors Physics, Astrophysics, Space Flight, Algorithms & Data Structures

Skills

Programming:	MATLAB, Java, Python, R
Scientific Computing:	Finite Differences, Finite Elements, Spectral Methods, Neural Networks
Software:	Ansys Maxwell, LaTeX, Git, VS Code, Paraview

Professional Development

Carnegie Mellon University — Pittsburgh, PA
CMU-Pitt DRP Presentation — Dec 2025

- Presented the culmination of my studies in computational plasmas physics, with an emphasis on finite element and spectral methods

Princeton University — Princeton, NJ
Summer School in Fluids and Computer Assisted Proofs — Aug 2025

- Attended lectures on numerical methods for fluid equations, neural networks, computer-assisted proofs, and career development

University of Alabama — Tuscaloosa, AL
Summer Research Symposium — Jul 2025

- Wireless Power Transfer for Monolithic and Heterogenous Integration of 3D Integrated Devices

Texas A&M University — College Station, TX
Summer School in Modeling and Simulation of PDEs — May 2025

- Attended a series of lectures and labs covering theory, modeling, finite difference methods, and finite element methods for partial differential equations
- Developed a 2D FDTD solver for Maxwell's equations on a graphene sheet with both a Uniform PML and Split PML as an absorbing boundary layer

Joint Mathematics Meetings — Seattle, WA
Pi Mu Epsilon Poster Session — Jan 2025

- Numerical Analysis of the Riemann Problem for a Cosmological 2×2 Balance System

West Virginia University — Morgantown, WV
Summer Research Symposium — Jul 2024

- Numerical Analysis of the Riemann Problem for a Cosmological 2×2 Balance System

Teaching Experience

University of Pittsburgh — Pittsburgh, PA
Teaching Assistant — Aug 2024 – Current

- Instructed recitation sessions and held office hours to reinforce lecture material and facilitate active student engagement in business calculus and algebra

University of Pittsburgh — Pittsburgh, PA
Mathematics Tutor — Jan 2023 – Current

- Provided direction and guidance via individualized sessions to students in mathematics, from college algebra through differential equations

West Virginia University — Remote
REU Mentor — Jun 2025 - Jul 2025

- Supported new REU cohort through mentorship in numerical analysis of system of balance laws and MATLAB programming