

Ana Isabel Fernandez Sirgo

PhD student, Applied Mathematics
Tucson, AZ

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Education

University of Arizona PhD in Applied Mathematics	Tucson, AZ <i>Fall 2021-Present</i>
University of Arizona Master of Science in Applied Mathematics	Tucson, AZ <i>Spring 2023</i>
University of Washington Master of Science in Applied and Computational Mathematics	Seattle, WA <i>Spring 2021</i>
Universidad de las Américas, Puebla BS in Mathematics; Magna Cum Laude	Puebla, México <i>Spring 2008</i>

Research Experience

Research Assistant <i>Luke A. McGuire, PhD.</i> <i>University of Arizona</i>	Tucson, AZ <i>Fall 2024 -Present</i> <i>Fall 2022 -Summer 2023</i>
Installed and maintained hydrological equipment at recently burned remote sites, developed data-driven hydrology models, and conducted geospatial data analysis. Research focused on hydrological modeling for postfire environments, with specialization in debris-flow prediction.	
Monte Carlo Tree Search Bot <i>University of Arizona</i>	Tucson, AZ <i>Spring 2024</i>
Developed a Monte Carlo Tree Search (MCTS) bot to play Tic-Tac-Toe and Othello. Implemented random simulations and statistical analysis to explore game trees, evaluate thousands of trajectories, and select optimal moves. The bot adapts dynamically to evolving game states, demonstrating strategic AI-driven gameplay.	
Shallow Water Equations and HEC-RAS Simulations <i>University of Arizona</i>	Tucson, AZ <i>Spring 2024</i>
Derived the Shallow Water Equations (SWE), analyzed their hyperbolic structure, and applied the Method of Characteristics. Implemented SWE in HEC-RAS to simulate sediment transport with varying concentrations and yield strengths, evaluating maximum depth, velocity fields, and downstream hydrographs.	

Bose–Einstein Condensation in 3D*University of Washington*

Seattle, WA

Spring 2021

Simulated the Gross–Pitaevskii system (nonlinear Schrödinger equation with potential) to model a condensed state of matter. Implemented periodic boundary conditions and used 3D FFT methods to solve the evolution numerically. Analyzed dynamics under different initial conditions and visualized results using isosurfaces and slices to study wave function behavior.

Machine Learning for Painter Recognition*University of Washington*

Seattle, WA

Fall 2020

Applied diverse machine learning algorithms to train a computer to recognize painters by their artworks. Evaluated classification accuracy across models and explored feature extraction techniques for artistic style identification.

Bachelor's Dissertation*Guillermo Aurelio Romero Meléndez, Ph.D.,**Universidad de las Américas, Puebla*

Puebla, Mexico

Fall 2006- Spring 2008

Undergraduate dissertation in mathematics, in which I extended an existing theorem in mathematics and produced a complete proof, demonstrating early independent research ability.

Teaching Experience

University of Arizona*Graduate Teaching Assistant*

Tucson, AZ

*Fall 2021**Spring 2022**Spring 2024*

Teaching Assistant in the Mathematics Department for the course Math 108, (Trigonometry). Assisted with the course by occasionally teaching class sessions, holding office hours, and grading assignments.

Rose Academy*High School Mathematics Teacher*

Tucson, AZ

Fall 2013-Summer 2017

Taught high school mathematics to under-credited, over-aged students working toward a high school diploma. Covered the full mathematics curriculum from grades 9 to 12, including AP-level courses, and taught subjects such as Discrete Mathematics, Trigonometry, and Pre-Calculus.

Colegio Americano de San Carlos, S.A. de C. V.
High School Mathematics Teacher

Sonora, México
Fall 2008- Summer 2011

Taught university-level mathematics to seniors entering university in the subjects of Engineering, Mathematics, and Physics. Also worked as a high school math teacher and as a middle school physics teacher, including a special mathematics class taught in English. Developed all curriculum and custom documents needed for the different classes and led instruction in a variety of mathematics areas, including Calculus, Pre-Calculus, Algebra, Geometry, Trigonometry, Logic, Advanced Logic, Probability, and more.

Universidad de las Américas, Puebla – Puebla, México
University Tutoring Center

Puebla, México
Fall 2006- Summer 2009

Designed and taught a program focused on helping students on the university's football team achieve academic success in their mathematics classes.

Universidad de las Américas, Puebla
Assistant Teacher to Professor Reyla Navarro

Puebla , México
Fall 2004- Summer 2006

Graded coursework, led classes and class activities, and assisted students with class material.

Entrepreneurial Experience

Gaia's Galley
Owner / Chef

Boulder, CO
Tucson, AZ
Fall 2011-Summer 2013

Created a unique vegan menu and concept for the business. Designed and managed the business webpage and social media tools, organized events, and handled company finances. Managed daily business operations.

Skills

Python, MATLAB, R, ArcGIS Pro, Julia, Git, MS Office

Publications

Fernandez Sirgo, A. I.; McGuire, L. A.; Youberg, A. M.; Liu, Tao (2025). Predictive models for postfire debris flow initiation in the Southwest USA. *Journal of Geophysical Research Earth Surface. In review.*

Conferences

Fernandez Sirgo, A. I.; McGuire, L. A.; Youberg, A. M.; Liu, T. (2025). Predictive Models for Post-fire Debris Flow Initiation in the Southwest USA. Establishing Directions in Postfire Geological Society of America (GSA), October 2025, San Antonio, TX. *Oral Presentation*.

Fernandez Sirgo, A. I.; McGuire, L. A.; Youberg, A. M.; Liu, T. (2025). Predictive Models for Post-fire Debris Flow Initiation in the Southwest USA. Establishing Directions in Postfire Debris Flow Science. Conference, May 2024, South Lake Tahoe, CA. *Poster Presentation*.

Fernandez Sirgo, A. I.; Romero Meléndez, G. A. Retratos Aproximativos Absolutos Lipschitz, XVI Congreso Nacional, Sociedad Mexicana de Matemáticas, June 2008. Valle de Bravo, México. *Oral Presentation*.

Languages

Spanish – Native

English – Fluent (13 years in the U.S., 1 year in Ireland)

Italian – Conversational (2 years in Florence; formerly fluent)

French – Intermediate (1 year in Paris)

Extracurricular Activities

Council member of *Moon Dance Huiztilmeztli* (The Moon of the Hummingbird). Established in 2012; participant since 2017; board member since 2024.

Council member of *Moon Dance Chalchicipatlmeztli* (The Moon of the Jade Alligator). Established in 2024; participant since 2024; board member since 2024.

Council member of *To 'aheedliinii* (Where Many Waters Meet). Established in 1997; participant since 2022; board member since 2023.

All three groups are dedicated to preserving our Indigenous culture and ceremony, maintaining our community spaces, and continuing the traditional ways of our ancestors.

Outreach

Brown Bag Student Colloquium Coordinator, Applied Mathematics Graduate Program (2025 - 2026).