

# Nicole Brewer

RESEARCH SOFTWARE ENGINEER | GRADUATE RESEARCH ASSISTANT

Arizona State University, Tempe, AZ

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## Education

### Arizona State University

Tempe, AZ

PHD COMPUTATIONAL HISTORY AND PHILOSOPHY OF SCIENCE

Expected May 2027

- Using natural language processing, network analysis, agent-based modeling, and high performance computing (HPC) to better understand how scientific standards of practice are motivated by reproducibility and other values

### Purdue University

West Lafayette, IN

BS MATHEMATICS WITH COMPUTER SCIENCE

December 2018

- Implemented and ran the KMP string matching algorithm in parallel to create a combinatorial game theory set

## Grants, Fellowships, and Awards

- 2022 **School of Life Science Fellowship** (\$2,500), Arizona State University
- 2021 **UPSS Delegate** (\$500), Philosophy of Science Biennial Meeting
- 2020 **Young Professional of the Year** (\$500), Science Gateways Community Institute
- 2018 **Travel Grant** (\$500), XSEDE
- 2018 **Phil Andrews Award**, Practice and Experience in Advanced Research Computing Conference

## Publications

- Brewer, N., Campbell, R., Kalyanam, R., Luk, K. I., Song, C. X., & Zhao, L. (2022). Benefits and limitations of jupyter-based scientific web applications. *2022 IEEE 18th International Conference on eScience (eScience)*.
- Brewer, N., Kim, H., Li, C., Anderson, H., Lanum, J., Cheoh, J., Hillery, B., & Overmyer, T. (2019). Student cluster competition 2018, team ada six of purdue university: Reproducing extreme scale multi-physics simulations of tsunamigenic 2004 sumatra megathrust earthquake on intel skylake architecture. *Parallel Computing, 90*, 102565. <https://doi.org/10.1016/j.parco.2019.102565>

## Presentations

- Oct 2022 **Software Engineering Topics Relevant to eScience** (Invited Panelist), eScience 2022, Salt Lake City, UT.
- Oct 2021 **How to Recruit and Sustain a Diverse and Inclusive Workforce: A Case Study** (Invited Panelist), International RSE Day, Virtual. <https://us-rse.org/events/2021/2021-10-intnl-rse-day>
- July 2021 **Leveraging Traits for Highly Interactive Computational Tools in Jupyter** (Abstract, Video Presentation), Gateways 2021, Virtual. <https://doi.org/10.5281/zenodo.5570605>
- June 2018 **Classification of Periodicity in Subtraction Game Sequences** (Poster), PEARC18, Pittsburg, PA.

## Professional Experience

### ITaP Research Computing

Purdue University

RESEARCH SOFTWARE ENGINEER

Feb 2019 - Present

- Implemented a highly interactive, Jupyter-based, GUI wrapper for power analysis software in order to expand the audience and ease of use of a rich set of computational functions via a user-friendly interface
- Facilitated software design, the implementation of best practices, and internal tool development, and lab documentation to improve the overall sustainability of lab software
- Transform disparate data acquisition and processing scripts into modular classes to be reused for scientific workflows

### Aptiv

West Lafayette, IN

SOFTWARE VERIFICATION ENGINEER

Nov 2017 - Nov 2018

- Developed comprehensive Unit Test projects that utilized CAN bus protocol communications to verify automotive controller hardware

## Research Experience

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### Graduate Research Assistant

CENTER FOR BIOLOGY AND SOCIETY, ARIZONA STATE UNIVERSITY

Aug 2022 - Present

- Advisor: Manfred Laubichler

### Student Cluster Competition Team

RESEARCH COMPUTING, PURDUE UNIVERSITY

June 2018 - Dec 2018

- Built a small cluster and applied optimization techniques in a non-stop, 48-hour challenge at the SC18 conference
- Compiled a scientific application from an accepted paper from the prior year's Technical Program and interacted directly with the paper's authors to reproduce specific results and conclusions from the paper

### CSol Channels Scholar REU

CENTER FOR SCIENCE OF INFORMATION, NSF STC

Jan 2016 - June 2017

- Utilized HPC clusters to efficiently create large data sets pertaining to combinatorial game theory
- Analyzed batching strategies of parallel computation to efficiently detect an unknown length of repeating sequences in long strings
- Developed a command line interface and file management system in Python to prevent human error and enhance the usability of codebase

## Service

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### Research Software Engineering Association

United States

STEERING COMMITTEE MEMBER

Jan 2022 - Present

- Committed at least five hours per week to steering committee and other meetings including the Diversity Equity and Inclusion (DEI), Outreach, and Code of Conduct and Moderation working groups
- Established the DEI Speaker Series and DEI Media Meetings. Currently developing a DEI Toolkit for members

### ITaP Research Computing

Purdue University

CO-CHAIR OF WOMEN IN HIGH PERFORMANCE COMPUTING

June 2020 - May 2022

- Organized and served as the host for invited talks where members shared their work or research
- Established the Long Tales of Science podcast to continue to improve visibility of women in HPC in spite of discontinuing in-person events in the wake of the COVID-19 pandemic

## Training

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### Graduate Partners in Science Education

Arizona State University

K - 12 STEM EDUCATION & OUTREACH

Aug - Dec 2022

- created an interactive lesson about parallel and distributed computing and modified existing lessons for remote instruction
- learned teaching practices that are engaging and inclusive

### San Diego Supercomputer Center

Virtual

SDSC SUMMER INSTITUTE

May 2020

- Machine learning in R, big data with Spark, parallel programming with Python, and scientific visualization

### Krannert Executive Education

West Lafayette, IN

APPLIED MANAGEMENT PRINCIPLES

July 2019

- Purdue's "mini-MBA" covering accounting, finance, strategy, marketing, negotiations & problem solving, and entrepreneurial skills essential to effective laboratory and research project management

## Conference Activity

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2022 **Committee Member**, Reproducibility Challenge

SC22

## Mentorship and Outreach

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### Mentor-Protégé Matching

SC22

MENTOR

Oct - Nov 2022

- Participated in virtual activities in the months leading up to the conference and provided career and educational advice to two mentees at the conference

### Student Cluster Competition

SC19

STAFF ADVISOR

Aug - Nov 2019

- Mentored students taking a weekly, two credit hour course in preparation for a competition that I had participated in the year prior

## Science Gateways Community Institute Hackathon

PEARC19

MENTOR

June 2019

- Answered students code-related questions over the course of an intensive, three day conference hackathon

## Discover Park Undergraduate Research Internship

Purdue University

STAFF MENTOR

Aug 2018 - May 2019

- Defined the scope of a small project related to our ongoing research projects and met with each student bi-weekly during the course of the semester to help them set achievable short-term goals and guide them through roadblocks they encountered

## Mentors for Aspiring Girls in Computing

Purdue University

NEAR-PEER MENTOR

Aug - Dec 2018

- Led hands-on activities to teach computer science concepts to local middle and high school students in order to improve the recruitment and retention of young women in technology careers

## Science Communication and Broader Impacts

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Nov 2022 **SC22 Mini-series: Reproducibility Initiative (in progress)** (Host), RSE Stories, Podcast.

<http://us-rse.org/rse-stories/posts/>

May 2022 **Trial by Fire** (Host), Long Tales of Science, Podcast.

<https://nicole-brewer.github.io/long-tales-of-science/004/>

Apr 2022 **Research Software Engineering** (Interviewee), Hello PhD, Podcast.

<http://helloworld.com/2022/03/172-research-software-engineer/>

Dec 2021 **Call 1-800-HLP-DESK** (Host), Long Tales of Science, Podcast.

<https://nicole-brewer.github.io/long-tales-of-science/003/>

Oct 2020 **Models and Simulations Run on the Cluster and in the Family** (Host), Long Tales of Science, Podcast.

<https://nicole-brewer.github.io/long-tales-of-science/002/>

## Teaching Experience

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### Object Oriented Programming

Purdue University

UNDERGRADUATE TEACHING ASSISTANT

Aug 2015 - May 2016

## Extracurricular Leadership

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2016 **Vice President**, Purdue University Triathlon Club

2015 **Social Media Manager**, Purdue University Triathlon Club