

# 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, machine learning, network analysis, agent-based modeling, high performance computing (HPC) resources, and ethnographic and social science methods 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 **GPSA Individual Travel Award** (\$950), ASU Graduate and Professional Student Association
- 2022 **eScience Travel Grant** (\$700), NSF
- 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>

## Posters and Presentations

- July 2021 **Leveraging Traits for Highly Interactive Computational Tools in Jupyter** (<https://doi.org/10.5281/zenodo.5570605>), Gateways 2021, Virtual ([video](#)).
- June 2018 **Classification of Periodicity in Subtraction Game Sequences** (<https://doi.org/10.5281/zenodo.7133317>), PEARC18, Pittsburgh, PA.

## Professional Experience

### ITaP Research Computing

Purdue University

RESEARCH SOFTWARE ENGINEER

Feb 2019 - Apr 2022

- 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

## 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

### 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

## Conference Activity

Nov 2022 **Member**, Reproducibility Challenge Committee, ([link](#)).

Supercomputing

Oct 2022 **Invited Panelist**, Software Engineering Topics Relevant to eScience, ([link](#)).

eScience

International RSE

Oct 2021 **Invited Panelist**, How to Recruit and Sustain a Diverse and Inclusive Workforce: A Case Study, ([slides](#)).

Day Virtual

Workshop

## Mentorship and Outreach

### 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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- Mar 2022 **Scientific Web Applications Template** (Presenter), US-RSE Community Call, Virtual, ([slides](#)).
- Nov 2022 **SC22 Mini-series: Reproducibility Initiative (in progress)** (Host), RSE Stories, Podcast, ([episode](#)).
- May 2022 **Trial by Fire** (Host), Long Tales of Science, Podcast, ([episode](#)).
- Apr 2022 **Research Software Engineering** (Interviewee), Hello PhD, Podcast, ([episode](#)).
- Dec 2021 **Call 1-800-HLP-DESK** (Host), Long Tales of Science, Podcast, ([episode](#)).
- Oct 2020 **Models and Simulations Run on the Cluster and in the Family** (Host), Long Tales of Science, Podcast, ([episode](#)).

## Certifications and Training

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### San Diego Supercomputer Center

SDSC SUMMER INSTITUTE

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

*Virtual*

*May 2020*

### Krannert Executive Education

APPLIED MANAGEMENT PRINCIPLES

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

*West Lafayette, IN*

*July 2019*

## Open Source Education and Training Resources

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- Sep 2022 **HPC Unplugged: A lesson plan for teaching parallel and distributed computing in middle school** (type)
- Aug 2022 **Corpus Creation with Scopus (in progress)** (type)
- Mar 2020 **R for Research Scientists** (type)

## Teaching Experience

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### Graduate Partners in Science Education: K - 12 STEM Education & Outreach

CURRICULUM DEVELOPER

### Object Oriented Programming

UNDERGRADUATE TEACHING ASSISTANT

*Arizona State University*

*Aug - Dec 2022*

*Purdue University*

*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