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 Univeristy — *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, Fellowhips, 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

1. 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)*.
2. 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

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 scienfitic 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

CSoI 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 managment 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 continute 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*
Oct 2021	**Invited Panelist**, How to Recruit and Sustain a Diverse and Inclusive Workforce: A Case Study, (slides).	*International RSE 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 advise 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

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

Certifications and Training

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 managment

Open Source Education and Training Resources

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

Graduate Partners in Science Education: K - 12 STEM Education & Outreach *Arizona State University*
Curriculum Developer *Aug - Dec 2022*

Object Oriented Programming *Purdue Univeristy*
Undergraduate Teaching Assistant *Aug 2015 - May 2016*

Extracurricular Leadership

2016 **Vice President**, Purdue University Triathlon Club
2015 **Social Media Manager**, Purdue University Triathlon Club