# 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*

**Purdue Univeristy** — *West Lafayette, IN*

BS Mathematics with Computer Science — *December 2018*

## 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)*. `https://doi.org/10.1109/eScience55777.2022.00094`
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`

## Honors and Awards

2022 **Outstanding Mentorship Award** ($750), ASU Graduate and Professional Student Association
2022 **GPSA Individual Travel Award** ($950), ASU Graduate and Professional Student Association
2021 **UPSS Delegate** ($500), Philosophy of Science Biennial Meeting
2020 **Young Professional of the Year Award** ($500), Science Gateways Community Institute
2018 **Phil Andrews Award**, Practice and Experience in Advanced Research Computing Conference

## Grants and Fellowships

Jan 2023 **Better Scientific Software Fellowship** ($25,000), Exascale Computing Project (DOE/NSF), Awardee.
Aug 2022 **School of Life Science Fellowship** ($2,500), Arizona State University, Awardee.

## Posters and Abstracts

June 2023 **Recommended Libraries for Cyberinfrastructure Users Developing Jupyter Notebooks** (poster) — *RMACC HPC Sym.*
Mar 2022 **Standalone Web Application Template** (presenter) — *Mini Gateways*
July 2021 **Leveraging Traits for Highly Interactive Computational Tools in Jupyter** (abstract) (video) — *Gateways*
June 2018 **Classification of Periodicity in Subtraction Game Sequences** (poster) — *PEARC*

## 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

Complex Adaptive Systems, Arizona State University — *Aug 2022 - Present*

- Advisor: Manfred Laubichler
- Using natural language processing, machine learning, network analysis, high performance computing, and mixed social science methods to model the evolution of scientific standards through time
- Documenting and adapting code and data from prior projects for reuse

### Student Cluster Competition, Reproducibility Challenge

Research Computing, Purdue University — *June 2018 - Dec 2018*

- Advisors: Betsy Hillery
- 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*

- Advisor: Mark Daniel Ward
- 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

# Talks and Panels

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|---|---|---|
| Mar 2023 | **Notebooks as Scholarly Objects** (host) | *US-RSE Comm. Call* |
| Oct 2022 | **Software Engineering Topics Relevant to eScience** (invited panelist) | *eScience22* |
| Mar 2022 | **Scientific Web Applications with Jupyter Notebooks** (presenter) | *US-RSE Comm. Call* |
| Oct 2021 | **How to Recruit and Sustain a Diverse and Inclusive Workforce** (invited panelist) | *Int'l RSE Day* |

# Conference Activity

Oct 2023 **Chair**, Notebook Submission Subcommittee, US-RSE Conference

Oct 2023 **Co-Chair**, Student Program Committee, US-RSE Conference

Nov 2022 **Committee Member**, Reproducibility Challenge, SC22

# Professional Service

### Council Member

*International*

International Council of RSE Association — *Jan 2022 - Present*

- Chaired and organized council meetings
- Participated in coordinated efforts, such as conferences, workshops, and podcast episodes, that fostered international collaboration

### Steering Committee Member

*United States*

Research Software Engineering Association — *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.

### Co-Chair

*Purdue University*

Women in High Performance Computing — *Jan 2020 - May 2022*

- Organized and served as the host for invited talks where members shared their work or research
- Created and maintained a formal newsletter featuring opportunities and events for members
- Submitted annual reports and participated in conference events for the international umberella orgainzation

## Reviewing

2023 **US-RSE**, Notebook Submissions

2023 **SciPy**, Tutorials and Digital Humanities

2022 **SC**, Student Cluster Competition, Reproducibility Paper

# Teaching Experience and Training

**Carpentries Instructor Training** — *The Carpentries*

Trainee — *June 2023*

**Graduate Partners in Science Education: K - 12 STEM Education & Outreach** — *Arizona State University*

Curriculum Developer — *Aug 2022 - Dec 2022*

**Object-Oriented Programming** — *Purdue Univeristy*

Undergraduate Teaching Assistant — *Aug 2015 - May 2016*

### Tutorials

July 2023 **How the Little Jupyter Notebook Became a Web App: Managing Increasing Complexity with nbdev** (4 hours), SciPy, Austin, TX

Apr 2023 **Notebook Submission Tutorial** (1.5 hours), US-RSE, Virtual

### Open Source Education and Training Materials

Sep 2022 **HPC Unplugged: A lesson plan for teaching parallel and distributed computing** (booklet)

Mar 2020 **R for Research Scientists** (booklet)

# Managerial Experience

**Program Developer and Manager** — *Arizona State University*

Two Full-Time Research Software Developer Internship — *Summer/Fall 2023*

- Led trainings, career sessions, code reviews, pair programming, and other sessions intended to prioritize student learning
- Advertized for research software developer positions, evaluated about 250 applications, interviewed graduate and undergraduates, and hired two full-time students
- Developed an 8-week internship program using the Agile framework to keep students both accountable to their original goals but adaptable to roadblocks frequently encountered in original research projects
- These two full-time summer and part-time fall positions were funded by the Better Scientific Software Fellowship listed above

**Applied Management Principles** — *Purdue University*

Krannert Executive Education — *July 2019*

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

**Staff Mentor** — *Purdue University*

Discover Park Undergraduate Research Internship — *Fall/Spring 2018*

- Defined the scope of a small research software project related to our ongoing research projects and met with each student to help them set achievable short-term goals and support them through challenges they encoutered

# Mentorship and Outreach

Fall 2022 **Mentor**, Mentor–Protégé Matching, SC22

Fall 2019 **Staff Advisor**, Student Cluster Competition, SC19

June 2019 **Mentor**, Science Gateways Community Institute Hackathon, PEARC19

Fall 2018 **Near-Peer Mentor**, Mentors for Aspiring Girls in Computing, Purdue University

# Science Communication and Broader Impacts

May 2023 **Host**, Reproducibility Initiative at SC22, *Long Tales of Science*. (episode)

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

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

Feb 2022 **Co-Author**, A kind-of brief shared early history of US-RSE, *US-RSE*. (post)

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

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

# Training

**SDSC Summer Institute** *Virtual*

San Diego Supercomputer Center *May 2020*

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

# Extracurricular Leadership

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

# Extracurricular Activity

**Music Theory and Piano Lessons** *Jan 2023 - May 2023*

Private lessons from ASU faculty associate Cathy Bates

**Vocalist and Keyboardist** *Aug 2022 - Dec 2022*

ASU Psychodelic Rock Band, RuQe

## Major Endurance Sport Events

Apr 2019 **USA Triathlon Collegiate Club National Championships**, Tempe, AZ
Oct 2018 **Chicago Marathon**, Chicago, IL
Aug 2018 **Ironman 70.3 Steelhead Triathlon**, Benton Harbor, MI
Aug 2017 **Ironman 70.3 Steelhead Triathlon**, Benton Harbor, MI
Apr 2017 **USA Triathlon Collegiate Club National Championships**, Tuscaloosa, AL
Nov 2016 **Monumental Marathon**, Indianapolis, IN
Aug 2016 **Ironman 70.3 Steelhead Triathlon**, Benton Harbor, MI
Apr 2016 **USA Triathlon Collegiate Club National Championships**, Clemson, SC
Jan 2016 **Disney World Marathon**, Orlando, FL