

# Nicole Brewer

RESEARCH SOFTWARE ENGINEER | GRADUATE RESEARCH ASSISTANT

Arizona State University, Tempe, AZ

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## Education

### Arizona State University

PHD COMPUTATIONAL HISTORY AND PHILOSOPHY OF SCIENCE

Tempe, AZ

Expected May 2027

### Purdue University

BS MATHEMATICS WITH COMPUTER SCIENCE

West Lafayette, IN

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

- Mar 2022 **Standalone Web Application Template** (presenter) *Mini Gateways 2022*
- July 2021 **Leveraging Traits for Highly Interactive Computational Tools in Jupyter** (abstract) (video) *Gateways 2021*
- June 2018 **Classification of Periodicity in Subtraction Game Sequences** (poster) *PEARC18*

## Professional Experience

### ITaP Research Computing

RESEARCH SOFTWARE ENGINEER

Purdue University

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

SOFTWARE VERIFICATION ENGINEER

West Lafayette, IN

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

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 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

- 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 management system in Python to prevent human error and enhance the usability of codebase

## Talks and Panels

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

## Conference Activity

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- 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

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### Council Member

INTERNATIONAL COUNCIL OF RSE ASSOCIATION

International

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

RESEARCH SOFTWARE ENGINEERING ASSOCIATION

United States

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

WOMEN IN HIGH PERFORMANCE COMPUTING

Purdue University

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 umbrella organization

## REVIEWING

- 2023 **US-RSE**, Notebook Submissions
- 2023 **SciPy**, Tutorials and Digital Humanities
- 2022 **SC**, Student Cluster Competition, Reproducibility Paper

## Teaching Experience

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### Object-Oriented Programming

UNDERGRADUATE TEACHING ASSISTANT

Purdue University

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)

## Science Communication and Broader Impacts

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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*. (episode)

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

## Mentorship and Outreach

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### Mentor-Protégé Matching

MENTOR

SC22

Oct - Nov 2022

- Provided career and educational advice and helped extend the professional network of an undergraduate mentee at the Supercomputing conference

### Student Cluster Competition

STAFF ADVISOR

SC19

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

MENTOR

PEARC19

June 2019

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

### Discover Park Undergraduate Research Internship

STAFF MENTOR

Purdue University

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

NEAR-PEER MENTOR

Purdue University

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

## Certifications and Training

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### SDSC Summer Institute

SAN DIEGO SUPERCOMPUTER CENTER

Virtual

May 2020

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

### Applied Management Principles

KRANNERT EXECUTIVE EDUCATION

Purdue University

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

## Extracurricular Leadership

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

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

## Extracurricular Activity

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### 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 PSYCHEDELIC 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