Nicole **Brewer**

Research Software Engineer | Graduate Research Assistant

Arizona State University, Tempe, AZ

nicole-brewer.com | nicole-brewer | nicole-brewer | catch_me_coding

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*

Professional Employment

Graduate Research Assistant — *Arizona State University*

Complex Adaptive Systems — *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

Research Software Engineer — *Purdue University*

ITaP Research Computing — *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

Software Engineer — *West Lafayette, IN*

Aptiv — *Nov 2017 – Nov 2018*

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

CSoI Channels Scholar REU — *West Lafayette, IN*

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

Grants, Awards, and Fellowships

Jan 2023 **Better Scientific Software Fellowship** ($25,000) Exascale Computing Project (DOE/NSF), Internal PI.

Dec 2022 **Outstanding Mentorship Award** ($750) ASU Graduate and Professional Student Association.

Aug 2022 **School of Life Science Fellowship** ($2,500) Arizona State University.

July 2020 **Young Professional of the Year Award**($500) Science Gateways Community Institute.

June 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)*. 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

Posters and Abstracts

Oct 2023	**Building Web Applications with Jupyter Notebooks among researchers and RSEs** (2nd author)	*US-RSE*
Oct 2023	**JupyterIDE: Promoting JupyterLab features and extensions that facilitate collaboration** (2nd author)	*US-RSE*
June 2023	**Recommended Libraries for Cyberinfrastructure Users Developing Jupyter Notebooks** (presenter)	*RMACC HPC Sym.*
Mar 2022	**Standalone Web Application Template** (presenter)	*Mini Gateways*
July 2021	**Leveraging Traits for Highly Interactive Computational Tools in Jupyter** (virual presenter) (abstract)	*Gateways*
June 2018	**Classification of Periodicity in Subtraction Game Sequences** (presenter)	*PEARC*

Talks and Panels

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*

Professional Service

International Council of RSE Association

International

Council Member

Jan 2022 - Present

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

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.

Women in High Performance Computing

Purdue University

Co-Chair

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

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

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

Student Cluster Competition, Reproducibility Challenge

SC23

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

Teaching

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** (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)

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

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

Science Communication

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)

Travel Awards

2022 **GPSA Individual Travel Award** ($950), ASU Graduate and Professional Student Association
2022 **eScience Travel Grant** ($700), National Science Foundation
2021 **UPSS Delegate** ($500), Philosophy of Science Biennial Meeting
2018 **Travel Grant** ($500), XSEDE

Extracurricular Leadership

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

Extracurricular Activity

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