

# JPUR

**JOURNAL OF PURDUE  
UNDERGRADUATE RESEARCH**

JPUR is sustained by the Purdue University Office of the Provost and the Honors College. The journal is produced by a team of Purdue University students with the support of the University Press and Libraries, Marketing and Communications, and the Writing Lab at Purdue. Special thanks to Chris Brannan, Katherine Purple, Tara Saunders, and Bryan Shaffer (PUP); Lima Gray and Olivia Sarault (Marketing and Communications); Karen Hum (Purdue Libraries); and Amy Childress and JJ Sadler (Office of Undergraduate Research). Research articles and snapshots in JPUR are copyrighted by their authors. Other content is copyright Purdue University.

ISSN 2158-4044 (Print)

ISSN 2158-4052 (Online)

## **JOURNAL COORDINATOR**

Catie Gilhooly, Senior, English

## **STUDENT EDITORIAL BOARD**

Adam Barmash Rubinchik, Gabi Castillo, Isabelle Chan, Matthew Corson, Daphne Fauber, Maggie Garg, Makaila Groves, Maggie Hsu, Lillian Millsbaugh, Asmi Mukherjee, Lauren Nolet, Aidan O’Nan, Anna Pence, Rachel Rosen, Carl Russell III, Shamalaa Sathissealan, Heather Stenger, Kaelyn Tai, Eli C Zuercher

## **JOURNAL ADVISOR**

Dr. Frank Dooley, Senior Vice Provost for Teaching and Learning

## **CHAIR OF THE FACULTY ADVISORY BOARD**

Prof. Greg Michalski, Earth, Atmospheric, and Planetary Sciences and Chemistry

## **FACULTY ADVISORY BOARD**

Prof. Kristina Bross, English  
Prof. Chao Cai, Purdue University Libraries  
Prof. Sugato Chakravarty, Consumer Sciences and Retailing  
Prof. Jennifer L. Freeman, Toxicology  
Prof. Naomi Gurevich, Communication Sciences and Disorders, Purdue University Fort Wayne  
Prof. John Howarter, Materials Engineering  
Prof. Mary E. Johnson, Purdue Polytechnic Institute  
Prof. Tamara Kinzer-Ursem, Biomedical Engineering  
Prof. Connie Kracher, Biology, Purdue University Fort Wayne  
Prof. Panayota Y. Mantzicopoulos-James, Educational Studies  
Prof. Michael J. Salvo, English  
Prof. Dennis Savaiano, Nutrition Policy  
Prof. Phillip VanFossen, Curriculum and Instruction  
Prof. Shuhui (Grace) Yang, Math, Statistics and Computer Science, Purdue Northwest

*Find out more about undergraduate research at Purdue*



Find us online



[www.jpur.org](http://www.jpur.org)



[www.twitter.com/ResearchPurdue](https://twitter.com/ResearchPurdue)

[www.facebook.com/ResearchPurdue](https://www.facebook.com/ResearchPurdue)



Visit the Office of Undergraduate Research for more opportunities:  
[www.purdue.edu/undergrad-research](http://www.purdue.edu/undergrad-research)  
[UGresearch@purdue.edu](mailto:UGresearch@purdue.edu)  
(765) 494-6505

<https://doi.org/10.7771/2158-4052.1704>