

Joan Ponce

Curriculum Vitae

Arizona State University
School of Mathematics and Statistical Sciences,
900 Palm Walk, Tempe, AZ 85281
office: WXMLR A841 ☎ (773) 742-4967
✉ joanponce90@gmail.com
🌐 ASU Website
Presidential Postdoctoral Scholar

Research Interests

Differential Equations, Dynamical Systems, Geospatial Modeling, Infectious Disease Modeling, Spatial Epidemic Modeling

Education

- 2014–2020 **Ph.D. in Mathematics**, *Purdue University*, West Lafayette, IN, USA,
Thesis Advisor: Zhilan Feng.
Dissertation: *Structured Epidemiological Models with Applications to COVID-19, Ebola, and Childhood-Diseases*.
- 2011–2013 **B.S. in Mathematics, Magna Cum Laude**, *University of Florida*, Gainesville, FL, USA,
Honors Thesis Advisor: Maia Martcheva.
- 2008–2011 **B.S. in Mathematics (not completed, transferred)**, *National Polytechnic*, Quito, Ecuador.

Appointments

- 2023–Present **Presidential Postdoctoral Scholar**, *Arizona State University*, Tempe, AZ, USA.
- 2021–2022 **Postdoctoral Scholar**, *University of California, Los Angeles*, Los Angeles, CA, USA.
- 2020–2020 **Research Assistant**, *Purdue University*, West Lafayette, IN, USA.
- 2016–2020 **Teaching Assistant**, *Purdue University*, West Lafayette, IN, USA.
- 2014–2014 **Research Assistant**, *MODEMAT*, Quito, Ecuador.
- 2011–2012 **Research Assistant**, *McGuire Center for Lepidoptera and Biodiversity*, Gainesville, FL, USA.

Fellowships, Scholarships and Grants

- 2024 Collaborate@ICERM program award (Summer 2025)
NSF Collaborative Research: Mathematical assessment of the role of large-scale sterile male mosquito release on malaria elimination and eradication prospects (Under Review)
SQuaREs program award, American Institute of Mathematics (AIM)

- 2022 ECMTB Landahl-Busenbergr Award, European Conference on Mathematical and Theoretical Biology
AWM Travel Grant, Association for Women in Mathematics, Amount: \$3000
Convergence Accelerator Team (CAT) Award, NSF-Simons Center for Multiscale Cell Fate Research
- 2020 Math Research Communities, MSRI travel grant
Grad Student Travel Grant to the Joint Mathematics Meetings
- 2019 SMB Landahl-Busenbergr Program Travel Grant
Purdue University College of Science Graduate Student International Travel Grant
- 2014–2019 NSF Graduate Research Fellowship
2014–2015 Ross Fellowship, Purdue University

Awards and Honors

- 2022–2024 MGB-SIAM Early Career (MSEC) Fellow
2013 President’s Honor Roll
2012 Dean’s List

Publications in Print

1. **Ponce, J.**, Okano, J., Low, A., et al. "HIV, geographic inequalities, and medical deserts." (To appear in *Nature Medicine*).
2. Zingoni, Z. M., Okano, J. T., **Ponce, J.**, Dullie, L., and Blower, S. "Modeling travel-time to HIV treatment in Malawi: identifying rural-urban and wealth inequities." *JAIDS Journal of Acquired Immune Deficiency Syndromes*, 2024. DOI: <https://doi.org/10.1097/QAI.0000000000002976>.
3. **Ponce, J.**, Thieme, H. "Can infectious diseases eradicate host species? The effect of infection-age structure." *Mathematical Biosciences and Engineering*, 20(10), 2023. DOI: <https://doi.org/10.3934/mbe.2023830>.
4. Song, J., Okano, J. T., **Ponce, J.**, Busang, L., Seipone, K., Valdano, E., and Blower, S. "The role of migration networks in the development of Botswana’s generalized HIV epidemic." *eLife*, 12, 2023. DOI: <https://doi.org/10.7554/eLife.85435>.
5. Qu, Z., Patterson, D., Childs, L., Edholm, C., **Ponce, J.**, Prosper, O., and Zhao, L. "Modeling Immunity to Malaria with an Age-Structured PDE Framework." *SIAM Journal on Applied Mathematics*, 2023. DOI: <https://doi.org/10.1137/21M1464427>.
6. Okano, J., **Ponce, J.**, Kronke, M., Blower, S. "Lack of ownership of mobile phones could hinder the rollout of mHealth interventions in Africa." *eLife*, 2022. DOI: <https://doi.org/10.7554/eLife.79615>.

7. Agosto, F., Erovenko, I., Fulk, A., Abu-Saymeh, Q., Romero-Alvarez, D., **Ponce, J.**, Sindi, S., Ortega, O., Onge, J., and Peterson, A. "To isolate or not to isolate: The impact of changing behavior on COVID-19 transmission." *BMC Public Health*, 2022. DOI: <https://doi.org/10.1186/s12889-021-12275-6>.
8. Zhang, S., **Ponce, J.**, Zhang, Z., Lin, G., and Karniadakis, G. "An integrated framework for building trustworthy data-driven epidemiological models: Application to the COVID-19 outbreak in New York City." *PLOS Computational Biology*, 2021. DOI: <https://doi.org/10.1371/journal.pcbi.1009334>.
9. Agosto, F., Goldberg, A., Ortega, O., **Ponce, J.**, Zaytseva, S., Sindi, S., and Blower, S. "How do interventions impact malaria dynamics between neighboring countries? A case study with Botswana and Zimbabwe." In *Using Mathematics to Understand Biological Complexity: From Cells to Populations*, 2021, Springer. DOI: https://doi.org/10.1007/978-3-030-57129-0_5.
10. **Ponce, J.**, Zheng, Y., Lin, G., and Feng, Z. "Assessing the effects of modeling the spectrum of clinical symptoms on the dynamics and control of Ebola." *Journal of Theoretical Biology*, 2019. DOI: <https://doi.org/10.1016/j.jtbi.2019.04.021>.
11. Gulbudak, H., **Ponce, J.**, and Martcheva, M. "Coexistence caused by culling in a two-strain avian influenza model." *Journal of Biological Dynamics*, 2014.

Publications in Progress

- Under Review Qu, Z., Patterson, D., Zhao, L., **Ponce, J.**, Edholm, C., Prosper, O. and Childs, L. "Mathematical modeling of malaria vaccination with seasonality and immune feedback"
- Ponce, J.**, and Thieme, H. R. "A Kermack–McKendrick type epidemic model with double threshold phenomenon (and a possible application to Covid-19)." *arXiv preprint*, 2024. DOI: <https://arxiv.org/abs/2409.17278>.
- Preprints Jastrebski, M., **Ponce, J.**, Burkow, D., et al. "Ticks, Deer, Mice, and a Touch of Sensitivity: A Recipe for Controlling Lyme Disease." arXiv:1308.2190v1.

Invited Talks

- 2024 Incorporating Heterogeneity in Malaria Models: Methods, Examples, and Implications. Virginia Commonwealth University, Biomath Seminar (remote), November 2024
- 2024 Interactions Between the Frequency of the Duffy Antigen and the Dynamics of *P. vivax* Malaria Infections. 2024 Fall Central Sectional Meeting, University of Texas, San Antonio, San Antonio, TX, USA. American Mathematical Society (AMS) Meeting, September 2024.
- 2023 HIV Spread and Treatment Distribution: Two Country Case Studies. Mini symposium: Data-driven modeling approaches to population biology. SIAM Texas-Louisiana Sectional Meeting, Lafayette, LA, USA. November 2023.
- 2023 HIV Spread and Treatment Distribution: Two Country Case Studies. Modeling, Computation, Nonlinearity, Randomness and Waves Seminar, University of Arizona, AZ, USA. September 2023.

- 2023 Optimal control of the COVID-19 pandemic: age-dependent release policies in Ecuador. Mini symposium: AMS Special Session on Understanding COVID-19: Three Years of Mathematical Models to Address the Global Pandemic I. Joint Mathematics Meetings, Boston, MA, USA. January 2023.
- 2022 Optimal control of the COVID-19 pandemic: age-dependent release policies in Ecuador. Department of Mathematics Colloquium, New Mexico Tech, NM, USA. November 2022.
- 2022 Geospatial modeling of accessibility to healthcare. Scientific Sessions: Mathematical Biology. Latinx in the Mathematical Sciences Conference 2022, IPAM, CA, USA. July 2022.
- 2022 An integrated framework for building trustworthy data-driven epidemiological models. AWM Special Session on Women in Mathematical Biology, Joint Mathematics Meetings. April 2022.
- 2021 Transmission dynamics of COVID-19 in Ecuador and age-dependent control strategies. Claremont Center for the Mathematical Sciences (CCMS) Applied Math Seminar, Claremont, CA, USA. November 2021.
- 2021 An integrated framework for building trustworthy data-driven epidemiological models: Application to the COVID-19 outbreak in New York City. From Machine Learning to Deep Learning Methods in Biology, Society of Mathematical Biology Annual Meeting. June 2021.
- 2020 Dynamics of a Childhood Disease Model with Isolation. AMS Special Session on If You Build It They Will Come: Presentations by Scholars in the National Alliance for Doctoral Studies in the Mathematical Sciences, I. Joint Math Meetings, Denver, Colorado, USA. January 2020.
- 2019 Bifurcation analysis of a childhood disease model with isolation. Claremont Center for the Mathematical Sciences (CCMS) Applied Math Seminar, Claremont, CA, USA. November 2019.
- 2018 Dynamics of a Childhood Disease Model with Isolation. Canadian Mathematical Society Winter Meeting, Vancouver, British Columbia, Canada. December 2018.
- 2018 Epidemiological Models with Quarantine. Student Colloquium, Purdue University, West Lafayette, Indiana, USA. October 2018.
- 2018 Assessing the Effects of Modeling the Spectrum of Clinical Symptoms on the Dynamics and Control of Ebola. Annual Symposium on Biomathematics and Ecology: Education and Research, Tempe, Arizona, USA. October 2018.
- 2018 Assessing the Effects of Modeling the Spectrum of Clinical Symptoms on the Dynamics and Control of Ebola. 6th International Conference of Math Biology, Beijing, China. June 2018.
- 2014 Optimal Control of a Lyme Disease Model. Primer Congreso Internacional de Ingenieria Biometrica y Modelizacion Matematica en Biociencias, Quito, Ecuador. May 2014.
- 2013 Ticks, Deer, Mice and a Touch of Sensitivity: A recipe for Lyme disease. Student Colloquium, University of Wisconsin-Whitewater, Whitewater, Wisconsin, USA. November 2013.

Teaching Experience

- Fall 2024 **Instructor**, *Arizona State University*, Tempe, AZ, USA.
Linear Algebra, MAT 342
- Spring 2024 **Instructor**, *Arizona State University*, Tempe, AZ, USA.
Mathematical Modeling, MAT 451
- Fall 2023 **Instructor**, *Arizona State University*, Tempe, AZ, USA.
Modern Differential Equations, MAT 275
- Spring 2023 **Instructor**, *Arizona State University*, Tempe, AZ, USA.
Modern Differential Equations, MAT 275
- 2016–2020 **Teaching Assistant**, *Purdue University*, West Lafayette, IN, USA.
Linear Algebra and Differential Equations, MAT 262

Students mentored

- Spring 2024– Malachi Vaughn. Honors Thesis
- Summer 2024 Gautam Rai, Elizabeth Ghartey, Dasha Selivonenko. Summer REU
- Fall 2024 Madeline Linden. Honors Contract

Service

Conference

- Sessions Organized
- Unveiling Complexity: Recent Developments in Mathematical and Computational Biology. National Diversity in STEM Conference, Phoenix, Arizona, USA. Oct 31 – Nov 2, 2024.
 - Uncovering the dynamics: Modeling and control of infectious diseases. SIAM Annual Meeting, Spokane, Washington, USA. July 8 –12, 2024.
 - Advances in Numerical Optimization, Control and Applications. Co-organizer, SIAM Conference on Optimization, Seattle, Washington, USA. May 31 – June 3, 2023.
 - Women in Math Biology. Co-organizer, SIAM Conference on the Life Sciences, Garden Grove, California, USA. June 8 – 11, 2020.
 - Mathematical Models for Infectious Diseases at Population Level. Organizer, SMB Annual Meeting, Montreal, Canada. July 22, 2019.
 - Mathematical Models for Infectious Diseases at Population and Individual Levels. Co-organizer with Kyle Dahlin, 6th International Conference on Mathematical Biology. BUCEA, Beijing, PR China, June 22-25, 2018.

Panels

- Attended
- Math Path Workshop. Georgia State University Math Path Program (Online Panel). July 18, 2022.
 - Maximizing Opportunities for BIPOC. Field of Dreams Conference, St. Louis, Missouri, USA. November 15–17, 2019.
 - NSF GRFP Information Session. Purdue University, West Lafayette, Indiana, USA. September 8, 2016.

Committees

- SIAM Committee on Strategic Initiatives. December 2023-Present.

Workshops Attended

- 2023 AIM Workshop: Multi-scale Modeling of Malaria, American Institute of Mathematics, San Jose, California. April 10–14, 2023.
- 2022 Collaborative Workshop for Women in Mathematical Biology, Institute for Pure and Applied Mathematics (IPAM), UCLA. June 17–21, 2019.
- 2018 Tutorial Workshop on Parameter Estimation for Biological Models, NC State University. July 25–28, 2018.
- 2013 The Mathematical and Theoretical Biology Institute (REU), Arizona State University. June–July, 2013.

Affiliations

- AWM Association for Women in Mathematics (AWM)
- AMS American Mathematical Society (AMS)
- AAAS American Association for the Advancement of Science (AAAS)
- SMB Society for Mathematical Biology (SMB)
- SIAM Society for Industrial and Applied Mathematics (SIAM)