




# ERIK AMÉZQUITA

I have interdisciplinary experience working in coding and data analysis research projects with plant biologists, archaeologists, and astronomers.

## CAREER AND EDUCATION

- present  
|  
2023
- **PFFIE Postdoctoral Future Faculty Fellow**  
University of Missouri  Columbia, MO  
· Joint appointment between the Division of Plant Sciences & Technology (80%) and the Department of Mathematics (20%)
  - **PhD, Computational Mathematics, Science & Engineering**  
Michigan State University  East Lansing, MI  
· Advisors: [Elizabeth Munch](#) and [Dan Chitwood](#)
  - **B.S., Mathematics**  
Universidad de Guanajuato  Guanajuato, Gto.  
· Advisor: [Antonio Rieser](#) (CONACYT-CIMAT)





## PEER-REVIEWED WORK

- 2024
- **Allometry and volumes in a nutshell: Analyzing walnut morphology using three-dimensional X-ray computed tomography**  
**E.J. Amézquita**, M.Y. Quigley, P.J. Brown, E. Munch, D.H. Chitwood  
· *The Plant Phenome Journal* 7: e20095. DOI: [10.1002/ppj2.20095](https://doi.org/10.1002/ppj2.20095)
  - **Genomics data analysis via spectral shape and topology**  
**E.J. Amézquita**, F. Nasrin, K.M. Storey, M. Yoshizawa  
· *PLoS ONE* 18(4): 30284820. DOI: [10.1371/journal.pone.0284820](https://doi.org/10.1371/journal.pone.0284820)
  - **A critical analysis of plant science literature reveals ongoing inequities**  
R.A. Marks, **E.J. Amézquita**, S. Percival, A. Rougon-Cardoso, C. Chibici-Revneanu, S.M. Tebele, J.M. Farrant, R. VanBuren, D.H. Chitwood  
· *PNAS* 120(10): e2217564120. DOI: [10.1073/pnas.2217564120](https://doi.org/10.1073/pnas.2217564120)
  - **The shape of aroma: measuring and modeling citrus oil gland distribution**  
**E.J. Amézquita**, M.Y. Quigley, T. Ophelders, D. Seymour, E. Munch, D. H. Chitwood  
· *Plants, People, Planet* 5(5): 698-711. DOI: [10.1002/ppp3.10333](https://doi.org/10.1002/ppp3.10333)
  - **Teaching Tools in Plant Biology. Plants and Python, Coding from Scratch in the Plant Sciences**  
R. VanBuren, A. Rougon-Cardoso, **E.J. Amézquita**, E. Coss-Navarrete, A. Espinosa-Jaime, O. Gonzalez-Iturbe, A. Luckie-Duque, E. Mendoza-Galindo, J. Pardo, G. Rodríguez-Guerrero, P. Rosiles-Loeza, M. Vásquez-Cruz, S. Fernandez-Valverde, T. Hernandez-Hernandez, S. Palande, and D.H. Chitwood  
· *The Plant Cell* 34(7): e1. DOI: [10.1093/plcell/koac187](https://doi.org/10.1093/plcell/koac187)



View this CV online at  
[ejamezquita.github.io/cv](https://ejamezquita.github.io/cv)

## CONTACT

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 [ejamezquita](https://github.com/ejamezquita)  
 [ejamezquita.github.io/](https://ejamezquita.github.io/)

## SKILLS

**Programming:** Python, R, C/C++, bash/unix

**Technologies:** *L<sup>A</sup>T<sub>E</sub>X*, RMarkdown, jupyter, vim, html/css

**Languages:** Spanish (native), English (fluent), French (elementary)

Made with the R package  
[pagedown](#).

Last updated on 2024-03-11.

- 2021 ● **Measuring hidden phenotype: Quantifying the shape of barley seeds using the Euler Characteristic Transform**  
E.J. Amézquita, M.Y. Quigley, T. Ophelders, J.B. Landis, D. Koenig, E. Munch, D. H. Chitwood  
· *in Silico Plants* 4(1): diab033. DOI: [10.1093/insilicoplants/diab033](https://doi.org/10.1093/insilicoplants/diab033)
- 2020 ● **The shape of things to come: Topological data analysis and biology, from molecules to organisms**  
E.J. Amézquita, M.Y. Quigley, T. Ophelders, E. Munch, D.H. Chitwood  
· *Developmental Dynamics* 249(7): 816-833. DOI: [10.1002/dvdy.175](https://doi.org/10.1002/dvdy.175)

## NON PEER-REVIEWED WORK

- 2024 ● **From hand measurements to high throughput phenotyping: understanding maize canopy structure and predicting yield**  
Z. Ji, E.J. Amézquita, L. Newton, D.H. Chitwood, A.M. Thompson  
· *Submitted*
- 2024 ● **Decoding the coiling patterns of *Cuscuta campestris* with automated image processing**  
M. Bentelspacher, E.J. Amézquita, S. Adhikari, J. Barros, S.Y. Park  
· *Submitted*. Preprint available. DOI: [10.1101/10.1101/2024.02.29.582789](https://doi.org/10.1101/10.1101/2024.02.29.582789)
- 2022 ● **Describing Demeter**  
E.J. Amézquita  
· Athens Science Observer. February 2022. Zine #3: Plant Phenotyping Edition. [Link](#).
- 2021 ● **Midiendo el fenotipo oculto con técnicas matemáticas novedosas**  
E.J. Amézquita. Edited by R. Shekar  
· Botany One. Blog entry. [Link](#)

## TEACHING AND MENTORING EXPERIENCE

- 2022 | 2019 ● **Experience at Michigan State University**
  - Mentor for the [ACRES REU](#). Conducted weekly professional development workshops and weekly social events for an undergraduate audience. Summer 2022.
  - TA for CMSE 201: Intro to Computational Modelling and Data Analysis. Fall 2019

Audience was mainly undergraduate students with no prior coding experience
- 2022 | 2021 ● **Teaching Assistant at other institutions in the US**
  - [SGI 2022](#). Summer Geometry Initiative REU. Massachusetts Institute of Technology.
  - [SGI 2021](#). Summer Geometry Institute REU. Massachusetts Institute of Technology.
  - [Code In Place](#). Stanford University.

Conducted virtually
- 2018 | 2016 ● **Teaching Assistant at CIMAT/Universidad de Guanajuato**
  - Precalculus and analytic geometry. Spring 2018
  - Topology I (Intro to point-set topology). Fall 2017
  - 14th Calculus Problem-solving Workshop. Summer 2017
  - Introduction to C++ and data structures (Online). Summer 2017
  - Introduction to probability. Fall 2016

Some courses involved leading tutorials on C++ or R



## INVITED TALKS

- 2023 ● **Mapper and the topological shape of genomic analysis**  
[MU-GNU International Symposium](#) in Plant Biotechnology. Bond LSC. Columbia, MO.
- 2023 ● **A primer on Topological Data Analysis**  
Geometry and Topology Seminar. Department of Mathematics. University of Missouri. Columbia, MO
- 2023 ● **Exploring the mathematical shape of plants**  
CS Colloquium. Department of Computer Science. Saint Louis University. St. Louis, MO
- 2023 ● **When topology meets plant morphology**  
[USTARS 2023](#). Underrepresented Students in Topology and Algebra Research Symposium, Seattle
- 2023 ● **The mathematical shape of plants**  
Plant Sciences Seminar. Department of Botany and Plant Sciences. University of California, Riverside
- 2023 ● **Measuring the shape of plants and nuts using topological data analysis**  
[JMM 2023](#). Joint Mathematics Meeting. American Mathematical Society. Boston, MA.
- 2022 ● **Using the Euler characteristic to quantify the shape of barley seeds**  
[OU Topology and Data Science Seminar](#). Department of Math. University of Oklahoma. Virtual
- 2022 ● **Bridging applied topology and plant biology**  
[JMM 2022](#). Joint Mathematics Meeting. American Mathematical Society
- 2022 ● **Measuring the shape of plants with the Euler Characteristic Transform**  
[UFTDA 2022](#). University of Florida Topological Data Analysis Conference. Gainesville, FL
- 2021 ● **Analyzing maize leaf angles and modeling leaf curvature**  
[2021 NAPPN](#). North American Plant Phenotyping Network. Virtual
- 2018 ● **Efficient object classification using the Euler characteristic**  
[II Coloquio](#) de Desarrollo Tecnológico al Servicio del Patrimonio Cultural. Guanajuato. Gto.



## SELECTED WORKSHOPS LEAD

- 2022 ● **The shape of things: Measuring the shape of plants with Topological Data Analysis**  
[2022 NAPPN](#). North American Plant Phenotyping Network. Athens, GA. [Check material](#).
- 2021 ● **Using the Euler characteristic to quantify the shape in biology**  
[2021 AATRN Tutorial-a-thon](#). Applied Algebraic Topology Research Network. [Watch video](#).
- 2021 ● **Measuring the shape of plants with Topological Data Analysis**  
[2021 NAPPN](#). North American Plant Phenotyping Network. [Check material](#).



## SELECTED POSTERS PRESENTED

- 2023 ● **The shape and size of shells, kernels, and cracks, in a nutshell**  
[CAFNR Research Symposium](#). University of Missouri. Columbia, MO
- 2022 ● **Using topology to analyze the shape of plants**  
[IPPS2022](#). International Plant Phenotyping Symposium. Wageningen, The Netherlands

- 2022 ● **Modeling the shape of citrus and their oil gland distribution**  
[OSU PSS](#). The Ohio State University Plant Sciences Symposium. Virtual
- 2017 ● **Archaeological object classification using the Euler characteristic**  
[Barrett Memorial Lectures](#). Math Department. University of Tennessee. Knoxville, TN



## SELECTED WORKSHOPS AND HACKATHONS ATTENDED

- 2022 ● **Beyond Abstract Measures: geometry and computation**  
Organized by the [Lorentz Center](#), Leiden, The Netherlands
- 2021 ● **Datathon4Justice**  
[D4J](#). Organized by QSIDE. Institute for Quantitative Study of Inclusion, Diversity, and Equity. Virtual
- 2021 ● **Immersive Visualization Institute**  
[IVI2021](#). Abrams Planetarium, MSU Libraries, and MSU Museum. East Lansing, MI



## OUTREACH

- 2023 ● **If life gives you lemons, analyze the shape of their aroma**  
Science on Tap. International Tap House. Columbia, MO
- 2023 ● **Mental Health in Mathematics and Computer Science**  
Panel organizer and moderator. [SGI23](#). Massachusetts Institute of Technology. Virtual
- 2022 ● **Webinar de Solicitudes al Doctorado en Estados Unidos**  
Panelist. Organized by the Coloquio de Exestudiantes CIMAT/DEMAT. Virtual
- 2022 ● **Mental Health in Mathematics and Computer Science**  
Panel organizer and moderator. [SGI22](#). Massachusetts Institute of Technology. Virtual
- 2021 ● **A topologist and a plant biologist go for a newly shaped beer**  
[Hispanics in STEM celebration](#). WaMPS. Michigan State University. East Lansing, MI
- 2020 ● **Using topology to quantify the shape of barley**  
[Summer Math Academy](#). Math Department. University of Toronto. Virtual
- 2020 ● **Wrangling and Presenting Data with Pandas and Seaborn in Python**  
[Social Science Data Analytics Initiative](#). Michigan State University. Virtual
- 2020 ● **Narrating our data with RMarkdown**  
[Social Science Data Analytics Initiative](#). Michigan State University. Virtual
- 2018 ● **La maldición de la dimensión y aprendizaje de máquina**  
Ciencia es Cultura. Dirección de Extensión Cultural. UGto. San Luis, Gto.
- 2017 ● **Un matemático y un psicólogo se hallan en Hanoi**  
Ciencia es Cultura. Dirección de Extensión Cultural. UGto. Guanajuato, Gto.
- 2016 ● **Infinitos grandes e infinitos pequeños**  
Ciencia es Cultura. Dirección de Extensión Cultural. UGto. San Miguel Allende, Gto.



## SELECT SERVICE

- 2022 | 2021  
● **President of the CMSE Graduate Student Organization**  
CMSE and the Council of Graduate Students
  - Lead department-wide events, committees, and inquiries to attend graduate students' needs
- 2017 | 2016  
● **Student Representative**  
College of Natural and Exact Sciences Council. Universidad de Guanajuato.
  - Logged each session minutes, such as budget or policy, and shared them with the math students.
- 2016 | 2015  
● **High School Mathematics Seminar Co-Organizer**  
Escuela de Nivel Medio Superior, Guanajuato. Guanajuato.
  - Delivered lectures on math topics usually not covered at high school levels, such as combinatorics or group theory.
- 2013 | 2012  
● **Tutor of the Guatemalan Math Olympiad Team**  
Math Olympiad National Team. Guatemala.
  - Successfully lobbied the Guatemalan Department of Education to obtain funding for 3 students to participate in the 15th Central American and Caribbean Math Olympiad.



## AWARDS

- 2024  
● **Travel Grant (US\$350)**  
[MW-ASPB 2024](#). ASPB Midwest Section. West Lafayette, IN
- 2024  
● **Best Flash Talk. 1st place out of 52 talks**  
[2024 NAPPN](#). North American Plant Phenotyping Network. West Lafayette, IN
- 2023  
● **Distinguished Graduate Student. Travel Grant (US\$700)**  
[USTARS 2023](#). Underrepresented Students in Topology and Algebra Research Symposium.
- 2022  
● **Best Poster Award. 3rd place out of 173 posters.**  
[IPPS2022](#). International Plant Phenotyping Symposium. Wageningen, The Netherlands
- 2022  
● **Travel Grant (EUR 2000)**  
[IPPS2022](#). International Plant Phenotyping Symposium. Wageningen, The Netherlands
- 2022  
● **Fitch H. Beach Award**  
College of Engineering. Michigan State University
  - 2nd place. Most outstanding graduate research within the College of Engineering.
- 2022  
● **Travel Grant (US\$800)**  
[2022 NAPPN](#). North American Plant Phenotyping Network. Athens, GA
- 2019  
● **Travel Grant (US\$800)**  
[Applied Mathematical Modeling with Topological Techniques](#). ICERM. Providence, RI
- 2019  
● **IMPACTS Fellowship**  
Awarded jointly by Michigan State University and the NRT-NSF program (NSF DGE-1828149).

- 2018 ● **Sotero Prieto Medal**  
Sociedad Mexicana de Matemáticas  
· Best undergrad math thesis produced in Mexico during the 2017-18 academic year.
- 2018 ● **Francisco Aranda Ordaz Award**  
Asociación Mexicana de Estadística  
· 3rd place. Best undergrad statistics theses produced in Mexico during the 2016-18 academic years.
- 2018 ● **Raymond P. and Marie M. Ginther Graduate Fellowship**  
Awarded by CMSE to outstanding incoming graduate students.
- 2018 |  
2013 ● **CIMAT Academic Excellence Scholarship**  
Merit-based scholarship for math undergraduates.
- 2017 ● **Best Undergraduate Mathematics, Physics and Earth Sciences Innovation Research Project.**  
4to Congreso Interinstitucional de Jóvenes Investigadores. 3rd Place. Nationwide event.
- 2017 ● **Best Undergraduate Engineering Research Project**  
5to Encuentro de Jóvenes Investigadores. 1st Place. Statewide event