


ERIK AMÉZQUITA


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

EDUCATION

current
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2018


- **PhD Candidate, Computational Mathematics, Science & Engineering**
Michigan State University  East Lansing, MI
 - Focused in quantifying plant morphology using topological data analysis (TDA) and X-Ray CT scans.
 - Advisors: [Elizabeth Munch](#) and [Dan Chitwood](#)
 - Expected graduation date: May 2023

2018
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2013


- **B.S., Mathematics**
Universidad de Guanajuato  Guanajuato, Gto.
 - [Thesis](#): Efficient object classification using the Euler characteristic
 - Advisor: [Antonio Rieser](#) (CONACYT-CIMAT)

RESEARCH EXPERIENCE


current
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2018

- **Graduate Research Assistant**
[Chitwood-Munch Lab](#)  Michigan State University
 - Exploring oil glands distribution of Citrus with directional statistics.
 - Characterized barley spikes morphology with the Euler Characteristic Transform and Topological Data Analysis.

2018
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2016

- **Undergraduate Research Assistant**
[Rieser Lab](#)  CIMAT
 - Part of CIMAT-IPICYT-INAH joint research involving mathematics, computer science and archaeology.
 - Provided a first new classification of a test set of pre-Columbian masks based on Euler characteristic curves.

2016





- **Undergraduate Researcher**
[Jack Lab](#)  Universidad de Guanajuato
 - Developed C/C++ code to check for presence of certain chemical elements in a supernova based on wavelength information.

PEER-REVIEWED WORK



View this CV online at
egr.msu.edu/~amezqui3/cv

CONTACT

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 egr.msu.edu/~amezqui3

SKILLS

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

Technologies: *L^AT_EX*,
RMarkdown, jupyter, vim,
html/css

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

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

Last updated on 2022-11-05.

- 2022 ● **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* DOI: [10.1002/ppp3.10333](https://doi.org/10.1002/ppp3.10333)
- 2022 ● **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)
- 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) pp. 816-833. DOI: [10.1002/dvdy.175](https://doi.org/10.1002/dvdy.175)



NON PEER-REVIEWED WORK

- 2022 ● **Genomics Data Analysis via Spectral Shape and Topology**
 E.J. Amézquita, F. Nasrin, K.M. Storey, M. Yoshizawa
 • Submitted. Preprint available. DOI: [10.48550/arXiv.2211.00938](https://doi.org/10.48550/arXiv.2211.00938)
- 2022 ● **Global disparities in plant science: a legacy of colonialism, patriarchy, and exclusion**
 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
 • Submitted. Preprint available. DOI: [10.1101/2022.10.15.512190](https://doi.org/10.1101/2022.10.15.512190)
- 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](#)
- 2021 ● **Measuring the hidden phenotype using novel mathematical techniques**
 E.J. Amézquita. Edited by R. Shekar
 • Botany One. Blog entry. [Link](#)



TEACHING AND MENTORING EXPERIENCE

2022
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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
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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
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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



SELECTED TALKS DELIVERED

2023

● Measuring the shape of plants and nuts using topological data analysis

[JMM 2023](#). Joint Mathematics Meeting. American Mathematical Society. Boston, MA.

2022

● Using topology to analyze the shape of plants

[Stochastic Topology and applications](#). Max Planck Institute for Mathematics in the Sciences (MiS).

2022

● The shape of aroma: measuring and modeling citrus oil gland distribution

[AMS Spring Central Sectional Meeting](#). American Mathematical Society

2022

● Bridging applied topology and plant biology

[JMM 2022](#). Joint Mathematics Meeting. American Mathematical Society

2022

● Measuring the shape of plants with Topological Data Analysis

[2022 NAPPN](#). North American Plant Phenotyping Network. Athens, GA

2022

● Measuring the shape of plants with the Euler Characteristic Transform

[UFTDA 2022](#). University of Florida Topological Data Analysis Conference. Gainesville, FL

2021

● Midiendo la forma en botánica usando Análisis Topológico de Datos

[XVI SEMBIOMAT](#). Sociedad Peruana de Matemática Aplicada y Computacional

- 2021 • **Quantifying barley morphology using the Euler Characteristic**
[SIAM Annual Meeting 2021](#). Society for Industrial and Applied Mathematics.
- 2021 • **Describing demeter: using the Euler characteristic to quantify the shape and biology**
[GLBIO 2021](#). Great Lakes Bioinformatics Conference.
- 2021 • **Analyzing maize leaf angles and modeling leaf curvature**
[2021 NAPPN](#). North American Plant Phenotyping Network.
- 2020 • **Quantifying the shape of barley using the Euler characteristic**
[YRF @ SoCG](#). Young Researcher Forum @ Symposium on Computational Geometry.
- 2018 • **Efficient object classification using the Euler characteristic**
[II Coloquio](#) de Desarrollo Tecnológico al Servicio del Patrimonio Cultural



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

- 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
- 2021 • **Using topology to analyze the shape of barley**
[GTDAML 2021](#). Geometry and Topology meet Data Analysis and Machine Learning.
- 2021 • **Using topology to analyze the shape of barley**
[TDA Workshop](#) @ IMSI. Insititute for Mathematical and Statistical Innovation.
- 2021 • **Using topology to analyze the shape of barley**
[SMB 2020 Annual Meeting](#). Society of Mathematical Biology.
- 2020 • **Using topology to analyze the shape of barley**
[TDA Workshop](#) @ NeurIPS 2020. Neural Information Processing Systems.

- 2017 ● **Object classification using the Euler characteristic**
[47th Annual John H. Barrett Memorial Lectures](#). Math Department. University of Tennessee
- 2017 ● **Bridging mathematics and archaeology**
[3a Escuela de Análisis Topológico de Datos y Topología Estocástica](#). ABACUS. CINVESTAV



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.
- 2021 ● **Immersive Visualization Institute**
[IVI2021](#). Jointly organized by Abrams Planetarium, MSU Libraries, and MSU Museum.



OUTREACH

- 2022 ● **Webinar de Solicitudes al Doctorado en Estados Unidos**
Panelist. Organized by the Coloquio de Exestudiantes CIMAT/DEMAT
- 2022 ● **Mental Health in Mathematics and Computer Science**
Panel organizer and moderator. [SGI22](#). Massachusetts Institute of Technology.
- 2020 ● **Using topology to quantify the shape of barley**
[Summer Math Academy](#). Math Department. University of Toronto
- 2020 ● **Wrangling and Presenting Data with Pandas and Seaborn in Python**
[Social Science Data Analytics Initiative](#). Michigan State University.
- 2020 ● **Narrating our data with RMarkdown**
[Social Science Data Analytics Initiative](#). Michigan State University.
- 2018 ● **La maldición de la dimensión y aprendizaje de máquina**
Ciencia es Cultura. Dirección de Extensión Cultural. Universidad de Guanajuato.
- 2017 ● **Un matemático y un psicólogo se hallan en Hanoi**
Ciencia es Cultura. Dirección de Extensión Cultural. Universidad de Guanajuato.
- 2016 ● **Infinitos grandes e infinitos pequeños**
Ciencia es Cultura. Dirección de Extensión Cultural. Universidad de Guanajuato.




SERVICE

- 2022
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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
- 2019
 - **Finance Comittee Chair. PBGB symposium**
Plant Breeding, Genetics, and Biotechnology symposium. Michigan State University.
- 2017
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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
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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
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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

- 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).

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- 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
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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