Matthew Andres Moreno

https://mmore500.github.io
matthew.andres.moreno@gmail.com
Biomedical and Physical Sciences Building
567 Wilson Road Room 1441
East Lansing, MI 48824

Education

Dual Ph.D., in Computer Science and Ecology, Evolutionary Biology, & Behavior (GPA: 4.0/4.0) Expected: May 2022
Research Advisor: Dr. Charles Ofria
Michigan State University, East Lansing, MI

Bachelors of Science in Mathematics, Computer Science (GPA: 3.96/4.0) May 2017
Minor in Chemistry
University of Puget Sound, Tacoma, WA

Relevant Coursework

Mathematics: Linear Algebra, Ordinary Differential Equations, Partial Differential Equations, Topology, Probability, Mathematical Statistics, Complex Analysis, Abstract Algebra I
Computer Science: Assembly Language & Computer Architecture, Programming Paradigms, Introduction to Artificial Intelligence, Software Engineering, Algorithms and Data Structures, Operating Systems
Biological Sciences: Organic Chemistry I & II, Cellular Biology, Genetics, Evolution, Neuroscience

Skills

Programming Languages: Python, Java, C, C++, OpenCL, Prolog, Haskell
Miscellaneous: LaTeX, Matlab, SageMath, Git

Academic Awards

- Recipient of National Science Foundation Graduate Research Fellowship (national award; 17% acceptance rate; 2018)
- Recipient of Blake and Mary Krueger University Distinguished Fellowship (institutional award; 0.2% acceptance rate; 2017)
- Recipient of BEACON Science and Technology Center Top Up Fellowship (departmental award; 2017)
- COMAP Mathematical Competition in Modeling Finalist (international award; 0.7% acceptance rate; 2017)
- Recipient of National Science Foundation Graduate Research Fellowship Program Honorable Mention (national award; 2017)
- Recipient of Edward Goman Outstanding Senior Award (departmental award, mathematics and computer science; 2017)
- Recipient of Roderick MacArthur Award for an Outstanding Honors Thesis Presentation (departmental award; 2017)
- Washington Consortium for the Liberal Arts College Essay Contest Campus Finalist (institutional award; 2017)
- Recipient of Great Lakes National Scholarship Program Award (national scholarship in STEM; 2016-2017)
- Recipient of James R. Slater Phi Beta Kappa Award (institutional award; 2016-2017)
- Recipient of Puget Sound Association of Phi Beta Kappa Scholarship (regional essay competition; 2016-2017)
- Recipient of Honors Alumni Scholarship (departmental award; 2015-2016, 2016-2017)
- Recipient of Thomas and Hilda Jack (2014-2015), Sprenger (2015-2016, 2016-2017), and McKnight Memorial (2016-2017) Scholarships in chemistry (departmental awards)
- Recipient of McGill Family (2015-2016), McKnight (2015-2016), and Thomas and Hilda Jack (2016-2017) Scholarships in mathematics (departmental awards)
- Recipient of Beta Theta Pi Men of Principle Scholarship (institutional award; 2014-2015)
- Recipient of University of Puget Sound Trustee Scholarship (institutional award; 2013-2017)
- Dean's List (institutional award; Spring 2014-Spring 2017)
- Member of Otis C. Chapman Honors Program (2013-2017)
- Member Phi Beta Kappa, Pi Mu Epsilon, Phi Kappa Phi, Upsilon Pi Epsilon

Projects and Research Experience

Otis C. Chapman Honors Thesis — University of Puget Sound, Tacoma, WA Fall 2016, Spring 2017
- *Student Researcher*

- Conducted a review of evolutionary computing literature and synthesize a theoretical analysis of evolvability in collaboration with advisor Dr. America Chambers and reader Dr. Adam Smith
- Performed computational experiments with Genetic Regulatory Network models to probe the relationship between phenotypic plasticity and evolvability.
- Prepared and delivered general-audience oral presentations at NW Honors Symposium and at the University of Puget Sound.

Software Engineering Term Project — University of Puget Sound, Tacoma, WA Fall 2016
- *Student Team Member*

- Collaborated with two other students to develop a full-stack web service leveraging the MEAN.JS framework.
- Designed and developed an idea journal service that collects and displays metadata to help users understand where, when, and how they are most creative.

Mathematical Biosciences Institute (MBI) Research Experience for Undergraduates — Newark, NJ Summer 2016
- *Student Researcher*

- Designed and numerically evaluated an individual-based set of differential equations to model the foraging behavior of ants over uneven terrain, analyzed predictions of the model over various experimental conditions.

- Collaborated with advisors Dr. Jason Graham and Dr. Simon Garnier in the Swarm Lab at the New Jersey Institute of Technology to develop and execute project.
- Prepared and delivered oral and poster presentations at a capstone conference in Columbus, Ohio.
- Participated in seminars and workshops on mathematical biology coordinated by MBI at The Ohio State University.

COMAP Mathematical Contest in Modeling — Tacoma, WA Spring 2015, 2016, 2017

- *Contest Participant*

- Collaborated in a small team of three students for four days to develop a mathematical model in response to a prompt.
- Communicated results in a journal-style paper describing our model and outlining recommendations to policy makers.
- In 2017, developed a model of vehicular traffic in the greater Seattle area to assess the impact of self-driving cars on commuter travel delays. Our model predicted that, in certain areas, designating lanes for exclusive use of autonomous would become advantageous once these vehicles constitute approximately 5% of traffic volume. Our team received a "Finalist" designation in the competition, ranking among the top 11 of 1,527 participating teams.
- In 2016, developed a model of satellite fragmentation events and the subsequent disbursement of debris in orbit to investigate the feasibility of quick-response efforts to neutralize debris generated by satellite explosions and collisions; our model suggested that, although technically feasible, such efforts would be economically impractical without a significant reduction in launch costs. Our team received received an "Honorable Mention" designation in the competition.
- In 2015, developed an epidemiological model to investigate the spread of Ebola virus disease and make recommendations on vaccine distribution; our model suggested that regional travel restrictions would not significantly curb the Ebola epidemic in West Africa and that efficient distribution of any vaccination should be prioritized over uniform or widespread distribution.

NASA Undergraduate Research Scholarship — Tacoma, WA Summer 2015

- *Student Researcher*

- Designed, applied for grant funding, and carried out project to develop algorithms for automated extraction of mouse ultrasonic vocalizations from noisy recordings in collaboration with advisor Dr. Adam Smith.
- Developed and tested filtering algorithms inspired by the Sobel Edge detection method that, after being trained on human-annotated spectrograms of mouse vocalizations, distinguish between true mouse vocalization signals and background noise, achieving 75% accuracy at 25% recall.
- Presented results and methodology at a poster session on campus attended by faculty, summer research students, and other students.

US Department of Agriculture Horticultural Crops Research Unit — Corvallis, OR Jun. 2013 – Jun. 2017

- *Biological Science Aide*

- Collected data for patent applications, performed plant propagation, assisted with field maintenance.

John Fowler Laboratory at Oregon State University — Corvallis, OR Summer 2011, 2012

- *Laboratory Assistant*

- Performed experimental inquiry into the role of the exocyst complex in *Arabidopsis thaliana* culminating in a symposium presentation.

Publications

Rex Cole, Valera Peremyslov, Savanah Van Why, Ibrahim Moussaoui, Ann Ketter, Rene Cool, Matthew Andres Moreno, Zuzana Velupkova, Valerian Dolja, and John E. Fowler. *A Broadly-Conserved NERD Interacts With The Exocyst To Affect Root Growth And Cell Expansion.* Journal of Experimental Botany. Manuscript submitted for publication.

Presentations

Matthew Andres Moreno. *Plasticity and Evolvability in a Genetic Regulatory Network Model.* BEACON Congress Poster Session, East Lansing, MI. August 2017.

Matthew Moreno. *Investigating the Relationship Between Plasticity and Evolvability in a Genetic Regulatory Network Model.* Math/CS Day, University of Puget Sound. April 2017.

Jordan Fonseca, Jesse Jenks, and Matthew Moreno. *MCM: Impact of Autonomous Vehicles on Seattle Traffic.* Math/CS Day, University of Puget Sound. April 2017.

Matthew Moreno. *COMAP Mathematical Competition in Modeling 2017.* Spring Experiential Learning Symposium, University of Puget Sound. April 2017.

Matthew Moreno. *Evolvability and Plasticity in a Genetic Regulatory Network Model.* Math & Computer Science Department Seminar Series, University of Puget Sound. April 2017.

Matthew Moreno. *Modeling the Collective Behavior of Ants on Uneven Terrain.* Phi Sigma Undergraduate Research Symposium, University of Puget Sound. April 2017.

Matthew Moreno. *Evolvability: What Is It and How Do We Get It?.* Otis C. Chapman Honors Program Thesis Presentation, University of Puget Sound. March 2017.

Matthew Moreno. *Modeling the Collective Behavior of Ants on Uneven Terrain.* Joint Mathematics Meetings, Atlanta, GA. January 2017.

Matthew Moreno. *Modeling Ant Foraging on Uneven Terrain.* Elements Science Magazine, University of Puget Sound. December 2016.

Matthew Moreno. *Evolvability in Evolving Artificial Neural Networks.* NW Honors Research Symposium, Seattle Pacific University. November 2016.

Matthew Moreno. *Modeling the Collective Behavior of Ants on Uneven Terrain.* Fall Poster Symposium, University of Puget

Sound. September 2016.

Matthew Moreno. *Modeling the Collective Behavior of Ants on Uneven Terrain.* Undergraduate Capstone Conference, Mathematical Biosciences Institute at The Ohio State University. August 2016.

Matthew Moreno and Becky Hanscam. *Relieving the Space Jam: Assessment of a Quick-Response Satellite Mission to Neutralize Debris from Orbital Fragmentation Events.* Math/CS Day, University of Puget Sound. April 2016.

Matthew Moreno. *Automated Extraction of Mouse Vocalizations from Noisy Recordings.* Fall Poster Symposium, University of Puget Sound. September 2015.

Matthew Moreno. *Mathematical Contest in Modeling: Eradicating Ebola.* Math/CS Day, University of Puget Sound. May 2015.

STEM Community Activities

- Macdonald Middle School, assistant in general and intervention mathematics classrooms (2017-2018)
  - Worked four hours weekly in a sixth grade geometry classroom and a seventh grade math intervention classroom.
  - Worked one-on-one and with small groups of students outside of the classroom to help students keep up with class material or cover new topics.
  - In the classroom, assisted students with questions and worked one-on-one to keep students engaged with class material.
- BEACON Elementary Science Nights outreach at Donley, Marble, Whitehills, Glencairn, Murphym Hiawatha, and Beagle Elementary Schools (2017-2018)
- BEACON outreach at MSU Science and Engineering Festival (2018)
  - Along with other NSF BEACON members, led hands-on activities to engage kids with key evolutionary ideas like natural selection and natural history.
- Lansing ArtREACH, science activity leader (2017)
- University of Puget Sound, computer science departmental mentoring program co-coordinator (2017)
  - Recruited upperclassmen mentors to lead small groups of underclassmen in computer science activities.
  - Planned and led social, brain teaser, and coding activities.
  - Publicized program through departmental announcement, posters, and classroom visits.
- Mount Tahoma High School, tutor (2016)
- University of Puget Sound Access Services, access coach for Tuesday Night Tutoring (2016)
  - Met with local middle and high school students for two hours weekly in an informal helproom setting on the University of Puget Sound campus.
  - Tutored homework material, shared study skills, and worked to make higher education feel approachable by building relationships with students and discussing college life.
- Oakland High School, volunteer (2016)
  - Worked with Communities in Schools for two hours weekly at a credit-recovery-focused alternative high school in Tacoma, WA.
  - Co-led an after-school Homework Club, aiming to help students complete assignments and feel more connected to the school.
  - Served as a classroom assistant, answering student questions and keeping students engaged with class material.
- Wilson High School, AP Tutor (2014)
- ACM International Collegiate Programming Contest, volunteer (2014, 2015)

Music Community Activities

- Puget Sound Wind Youth Wind Ensemble, coach (2015-2016)
  - Played alongside local high school oboists in ensemble rehearsal and concert.
  - Planned and led sectional rehearsals, working to develop individual technique, section coordination, and social connections.
- Youth Orchestral Recital Series, ensemble member (2016)
- University of Puget Sound Commencement Band, performer (2014, 2015, 2016)
- University of Puget Sound Wind Ensemble and Symphony tours, performer (2014, 2015, 2016, 2017)
- Puget Sound Conductors Institute, ensemble member (2014, 2015, 2017)
- Le Comte Ory, pit orchestra player (2015)
- Jacobsen Children's Concert, performer (2014)
- Collage Concert, performer (2014)

Miscellaneous Community Activities

- Atom `git-edit-atom` package, developer (2016-2017)
- National Conference on Peer Tutoring in Writing, session chair and volunteer (2016)
- Jason Lee Middle School Access to College Days, student panelist (2016)
- University of Puget Sound Office of Donor Relations, student speaker (2016)
- University of Puget Sound Student Accessibility and Accommodation, note taker (2015, 2016)

Employment

University of Puget Sound Center for Writing, Learning, & Teaching — Tacoma, WA Sept. 2015 – May 2017

- Tutor and Academic Consultant

- Helped mathematics students work through assignments, led study sessions to prepare students for examinations, and provided a safe and supportive environment to discuss frustrations and build self-confidence.

- Conducted academic advising appointments, working with students develop organization, communication, and time-management skills, particularly in the context of executive function or other impairments.
- Liaised with faculty members to discuss coursework and support students.
- Developed, led, and participated in professional development activities for student staff.

University of Puget Sound Mathematics & Computer Science Department — Tacoma, WA Sept. 2014 – May 2017
- *Tutor and Grader*

University of Puget Sound Chemistry Department — Tacoma, WA Sept. 2013 – May 2016
- *Storeroom Assistant*

Network Enterprises, LLC — Corvallis, OR Sept. 2010 - Aug. 2013
- *Web Design Assistant*

Extracurricular Activities
- Oboe performance in University Wind Ensemble (co-principal) and Symphony, private study
- Model United Nations Club, conference delegate and treasurer (2013 - 2016)
- University of Puget Sound Economics Department Blog, contributor (2013 - 2016)