

MITCHELL EITHUN
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EDUCATION

Michigan State University (East Lansing, Michigan)
Ph.D. in Computational Mathematics, Science and Engineering
University Fellow

Started August 2017

Ripon College (Ripon, Wisconsin)
B.A. in Mathematics, Computer Science, Minor in Music
Summa Cum Laude (GPA: 3.99/4.00)

August 2013 – May 2017

ACADEMIC PAPERS

Peer-Reviewed Journal Articles

- 1 Preprint: Isolating phyllotactic patterns embedded in the secondary growth of sweet cherry (*Prunus avium* L.) using magnetic resonance imaging, with Elizabeth Munch, Daniel H. Chitwood, Gregory Lang and James Larson. (2019). [[arXiv:1812.03321](https://arxiv.org/abs/1812.03321)]
- 2 An all-encompassing global convergence result for processive multisite phosphorylation systems, with Anne Shiu. *Mathematical Biosciences*, vol. 291, pp. 1-9 (2017). doi.org/10.1016/j.mbs.2017.05.006
- 3 Long-term versus short-term strategy in the game of *Monopoly*, with McKenzie Lamb and Andrea Young. *Journal of Undergraduate Mathematics and Its Applications*, vol. 38, issue 1, pp. 35-57 (2017).

Peer-Reviewed Conference Papers

- 4 Topological Mapper for 3D Volumetric Images, with Elizabeth Munch, Daniel H. Chitwood and Tim Ophelders. *Proceedings of the 14th International Symposium on Mathematical Morphology* (2019).
- 5 Bringing Computational Science to Collegiate Education. *Proceedings of the American Society for Engineering Education, North Central Section Conference* (2019).

RESEARCH EXPERIENCE

- I am second-year graduate student at Michigan State University interested in computational approaches to plant morphology, the study of the physical form and structure of plants. Using 3D imaging techniques (e.g. computed tomography), I develop methods to track the growth of plant organs and extract intrinsic patterns. Tools include standard image processing techniques and topological data analysis methods such as mapper and persistent homology. Some of my long-term goals including writing parallel algorithms to process 3D scans, constructing 4D movies of plant growth, implementing topological mapper for plant structures and creating accessible web tools for education. My advisers are Dr. Dan Chitwood and Dr. Elizabeth Munch (Jan 2018 – Present).
- I was part of a paid Research Experience for Undergraduates (REU) in Mathematical Biology at Texas A&M University and worked closely with Dr. Anne Shiu on the convergence of phosphorylation systems using graph theoretic stability criteria. I presented “An All-Encompassing Convergence Result for Processive Multisite Phosphorylation Systems” at several academic conferences and published a paper (May 2016 – Jul 2016).
- At Ripon College I worked with Dr. Andrea Young and Dr. McKenzie Lamb to write a computer simulation of the board game *Monopoly* in Python. Using parallel processing and discrete optimization I explored the effects of different strategies and rules sets. Funding from Ripon College supported my summer research in 2014 and 2015 (Jun 2014 – Aug 2015).

AWARDS

- Outstanding Teaching Assistant Award (Apr 2019)
- Michigan State University Graduate Fellowship (Aug 2017)
- Raymond P. and Marie M. Ginther Graduate Fellowship (Aug 2017)
- Ripon College Mathematics Award (Apr 2017)

- Ripon College Computer Science Award (Apr 2017)
- Student Leadership Award (Apr 2016, Apr 2017)
- Student Paper Award at MAA MathFest, Pi Mu Epsilon (Aug 2016)
- Ripon College Mathematics and Computer Science Award (Apr 2016)
- Lucile Mosling Grams Music Award (Apr 2016)
- Clifford Crump Phi Beta Kappa Award (Apr 2016)
- AP Scholar With Distinction (Jul 2013)

PRESENTATIONS

Conference Talks

Bringing Computational Science to the Collegiate Curriculum. 2019 American Society for Engineering Education, Grand Rapids, MI, March 2019

Algorithmic Isolation of Phyllotactic Growth Patterns. Phenome, Tuscon, AR, January 2019

An All-Encompassing Global Convergence Result for Multisite Processive Phosphorylation Systems. The Joint Mathematics Meetings, Atlanta, GA, January 2017

An All-Encompassing Global Convergence Result for Multisite Processive Phosphorylation Systems. Pi Mu Epsilon Regional Conference, St. Norbert College, De Pere, WI, November 2016

An All-Encompassing Global Convergence Result for Multisite Processive Phosphorylation Systems. MAA-MathFest, Columbus, OH, August 2016

Modeling Monopoly with Monte Carlo Simulations. MAA-Wisconsin Spring Meeting, Ripon College, Ripon, WI, April 2015

The Oz-Some Power of Linear Algebra, with Allwin McDonald. MAA-Wisconsin Spring Meeting, Ripon College, Ripon, WI, April 2015

Modeling Monopoly with Monte Carlo Simulations. The Joint Mathematics Meeting, Ripon College, San Antonio, TX, January 2015

Modeling Monopoly with Monte Carlo Simulations. MAA-Wisconsin Spring Meeting, University of Wisconsin-Whitewater, Whitewater, WI, April 2014

Posters

Algorithmic Isolation of Phyllotactic Growth Patterns. Michigan State University Engineering Graduate Research Symposium, East Lansing, MI, March 2019

Algorithmic Isolation of Phyllotactic Growth Patterns. Phenome, Tuscon, AR, January 2019

Computational Plant Morphology. IMPACTS Symposium, Michigan State University, East Lansing, MI, August 22, 2018

An All-Encompassing Global Convergence Result for Multisite Processive Phosphorylation Systems. Annual Ripon College Research Symposium, Ripon, WI, April 11, 2017

Other Talks

Bringing Computational Science to Collegiate Education. Computational Education Brown Bag Seminar, Michigan State University, East Lansing, MI, November 28, 2018

Bread for the World: Modern Christian Communities in Western Europe. Learning Abroad Conference, Michigan State University, East Lansing, MI, November 16, 2018

Harry Potter and The Sacred Text. MSU Wesley, East Lansing, MI, February 2018

Life Well-Loved. Ripon College Baccalaureate Service, First Congregational Church, Ripon, WI, May 2017

A Neuroevolutionary Approach to Super Mario Bros. AI. Computer Science Senior Seminar, Ripon College, Ripon, WI, April 2017

The Discrete Curve-Shortening Flow. Mathematics Senior Seminar, Ripon WI, November 2017

TEACHING EXPERIENCE

Teaching Assistant

Fall 2018

Michigan State University

- TA for CMSE 801: Introduction to Computational Modeling.
- Facilitated in-class group work, ran office hours, graded homeworks, projects and exams.

Mathematics Department Assistant

Jan 2014 — May 2017

Ripon College

- Mentored students during drop-in tutoring sessions.

Student Support Services Tutor

Oct 2014 — Dec 2015

Ripon College

- Tutored students one-on-one in Calculus I and Calculus II.

Course Assistant

Spring 2014

Ripon College

- Helped lead activities in Calculus I and led an end-of-semester review session.

Private Math Tutor

Mar 2012 — May 2014

- Helped several students with Middle School Math, Algebra and Algebra II.
- Taught all of Algebra I to a student entering a competitive high school. (2013)
- Provided free tutoring services for a low-income student. (2012 – 2013)

OUTREACH

- Presenter at the MSU Science Festival: “Plants, Patterns and Parastichies” (2019)
- Vice President of CMSE Graduate Student Organization. Organized game nights and social activities. (2017 – 2019)
- President of the Ripon Math Club. Awarded a “20 for ‘16” grant from Ripon College to host mathematician George Hart. Organized outreach events, including movie showings, geometric construction workshops and campus collaborations. Charter President of Pi Mu Epsilon at Ripon College. (2015 – 2016)
- Annual IT volunteer for Badger Boys State, a one-week citizenship camp for high school boys. Duties include editing video content, taking pictures and archiving media. (2013 – 2015)

OTHER PUBLISHED WORK

Handbell Music

1. “Fantasy on Come All Ye Shepherds” for 3-5 octave handbells. Chorister’s Guild. *Forthcoming.*
2. “Let All Mortal Flesh Keep Silence” for 3-6 octave handbells. GIA: 2020. *Forthcoming.*
3. “Reflections on Beach Spring” for 3-6 octave handbells. Lorenz: 2020. *Forthcoming.*
4. “There is a Happy Land” for 3-5 octave handbells. SoundForth: 2020. *Forthcoming.*
5. “Lord, I Want to Be a Christian” for 3-5 octave handbells. GIA: 2019. *Forthcoming.*
6. “Christmas Don’t Be Late” for 3-5 octave handbells. Alfred. *Forthcoming.*
7. “Shepherd’s Hey” for 3-6 octave handbells. From the Top. *Forthcoming.*
8. “Freedom March” for 2-3 octave handbells. Chorister’s Guild. *Forthcoming.*
9. “Go to Dark Gethsemane” for 3-5 octave handbells. Concordia Publishing House: Summer 2019.

10. "Processional on He Is Born" for 3-5 octave handbells. Overtones: Fall 2018
11. "Communion Quartet" for 3 octave handbells. Overtones: Fall 2018
12. "Waltz on Hyfrodol" for 3-6 octave handbells. Lorenz: Fall 2018
13. "Mystic Spirit" for 3-7 octave handbells. Beckenhorst Press: Fall 2018
14. "Lift Up the Gates Eternal" for 3-7 octave handbells. Beckenhorst Press: Spring 2018
15. "On This Day Earth Shall Ring" for 3-6 octave handbells. Overtones: Fall 2017
16. "Allegro Molto Appassionato" for 3-5 octave handbells. Choristers Guild: Fall 2017
17. "Joyful Acclamation" for 3-5 octave handbells. AGEHR Music: Fall 2017
18. "Joy Abounds" for 3-5 octave handbells. Handbells Magazine: Spring 2017
19. "A Lincolnshire Dance Song" for 4-7 octave handbells. Beckenhorst Press: Fall 2016

News Articles

Ripon College students sit in on Democratic debate, meet Woodruff, Ripon Commonwealth Press, February 17, 2016

SKILLS

Languages \LaTeX , Python, C/C++, Matlab, Maple, VBA
Software 3D Slicer, Wordpress, Adobe Premiere Pro, Sibelius 7, MS Office