

James Rohal

Assistant Professor at West Liberty University (2014 – Present)

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Education

- 2016 – Present **Data Science Specialization**, John Hopkins University on Coursera.
- 2009 – 2014 **Ph.D. in Applied Mathematics**, North Carolina State University.
Concentration: Computational Mathematics.
Thesis Title: *Connectivity in Semi-Algebraic Sets*.
Thesis Adviser: Hoon Hong.
- 2007 – 2009 **M.S. in Mathematics**, Miami University.
- 2003 – 2007 **B.A. in Mathematics with Minor in Computer Science**, College of Wooster.
- 2006 **Budapest Semesters in Mathematics**, Technical University of Budapest.

Research Experience

- 2015 – Present **West Liberty University**.
- Implementing an existing interval ordinary differential eq. solver algorithm in C++ using the Boost interval library.
 - Creating a recommender system for the word association game *Codenames* to aid in gameplay. It is being built using WordNet, tools from graph theory, and data mined from Wikipedia.
- 2009 – 2014 **North Carolina State University**. Doctoral thesis research conducted with Dr. Hoon Hong. Developed correctness and termination results for an algorithm to determine whether two points lie in a same connected component of a semi-algebraic set. This problem is relevant to the field of (robot) motion planning. One paper is currently in preparation on these results.
- 2007 – 2009 **Miami University**. Master's thesis research conducted with Dr. Stephen Wright. Developed an algorithm to solve a nonlinear optimization problem by using a modified interior point method. This allocation problem is relevant to capacity planning and production planning. We compared the efficiency of the new algorithm with the efficiency of existing algorithms. A single paper was published based on these results.
- 2006 – 2007 **The College of Wooster**. Senior thesis research conducted with Dr. Charles Hampton. Studied arbitrary-precision methods using interval arithmetic in *Mathematica*. Programmed solutions to several SIAM 100-Dollar, 100-Digit Challenge problems.
- Summer 2006 **University of Akron**. Research Experience for Undergraduate project conducted with Dr. Judith Palagallo and Dr. Jeffrey Adler. Proved a generalized result about self-similar periodic tilings on nilpotent Lie groups. Fractal images were produced using OpenGL and C++.

Publications

- H. Hong, J. Rohal, M. Safey El Din, and É. Schost. Connectivity in Semi-Algebraic Sets I. In preparation.
- 2014 S.E. Wright, J.J. Rohal. Solving the continuous nonlinear resource allocation problem with an interior point method. *Operations Research Letters*, Volume 42, Issues 6–7, September 2014, pp. 404-408.

Technical Knowledge

- Programming C++, Java, Python, R, MATLAB, Maple, *Mathematica*, PHP, SQL
- Comp. Sci. Graphics, Algorithms, Computer-Assisted Education, Motion Planning
- Mathematics Numerical Analysis, Graph Theory, Optimization (Linear and Nonlinear Programming), Algebraic Geometry, Computer Algebra, Topology, Linear Algebra, Matrix Analysis, Differential Equations

Mentoring

- 2015 – 2016 **West Liberty University**. Weekly meetings with undergraduate students to oversee original research.
- Alexis Brum: Combinatorial motion planning.
 - Brenton Murphy: Chaos theory and the butterfly effect.
 - Caleb Casto: Critical points of routing functions under perturbation.
- 2014 – 2015 **West Liberty University**. Weekly meetings with undergraduate students to oversee capstone projects. Helped with any coding and editing of a final manuscript.
- Alexis Brum: Using graph search algorithms in discrete motion planning.
 - Liza Jones: Markov chains and Google's PageRank algorithm.
 - Scott Kaiser: 8th grade lesson plans satisfying the WV Next Generation standard.
 - MacKenzie Krieger: Graph theory and modern board game design.
 - Mark Winters: Real root isolation.
- 2011 – 2013 **North Carolina State University**. Bi-weekly meetings with graduate students during the summer to oversee their Research Experience for Graduate Student projects.
- Mary Ambrosino: Gaps between consecutive exponents in cyclotomic polynomials.
 - Cleveland Waddell: Closed form for higher order derivatives of an implicitly defined function.
 - Aaron Herman: Root separation bounds.

Teaching Experience

- Spring 2016 **West Liberty University**. Computer Programming for the Sciences, Precalculus (Two Sections), Introduction to Statistics.
- Fall 2015 **West Liberty University**. Topology, Finite Mathematics, Precalculus (Two Sections), Introduction to Statistics.
- Spring 2015 **West Liberty University**. Numerical Analysis, Mathematics (Research) Seminar, Computer Programming for the Sciences, Precalculus.
- Fall 2014 **West Liberty University**. Calculus II, Precalculus (Two Sections).

- 2009 – 2014 **North Carolina State University.** Calculus III (Five Sections),
Calculus II (Three Sections).
- 2007 – 2009 **Miami University.** Calculus I (Two Sections), Precalculus (Two Sections).

Pedagogical Training

- January 2016 Project NExT Workshops at the Joint Mathematics Meetings: Professional development program for recent Ph.D.s in the mathematical sciences through the MAA.
- *Broadening Assessment of Student Learning*
 - *Integrating Writing in Undergraduate Courses*
 - *How to Successfully Flip Your Classroom*
 - *Designing an Original Course*
- August 2015 Project NExT Workshops at MAA MathFest.
- *Undergraduate Research - How to Make It Work*
 - *Teaching with Projects*
 - *Teaching Real Analysis*
 - *Stereotype Threat*
 - *Learning and the Brain*
 - *Challenging Scenarios for Professors*
 - *Successful Calculus Programs*
 - *Show Me the Data*
 - *Time Management*
 - *Establishing Your Professional Identity*
 - *Interactive Teaching Methods*
 - *How Now Shall We Teach Mathematics*
- April 2015 *Social Justice and Mathematics*, Section NExT Workshop at Washington & Jefferson College.
- October 2014 *Flipping the College Classroom: Transform Students into Active Learners*, Webinar at West Liberty University.
- August 2009 North Carolina State University Teaching Assistant Workshop.
- August 2007 Miami University Seminar in the Teaching of First-Year Mathematics and Statistics.

Posters and Presentations

- November 2015 *P vs. NP*. Seminar talk, West Liberty University.
- March 2015 *Introduction to L^AT_EX*. Seminar talk, West Liberty University.
- May 2014 *Connectivity in Semi-Algebraic Sets*. Thesis defense, North Carolina State University.
- April 2014 *Connectivity in Semialgebraic Sets*. Seminar talk, Symbolic Computation Seminar, North Carolina State University.
- January 2014 *Connectivity in Semialgebraic Sets*. MAA General Contributed Paper Session on Research in Algebra and Topology (I), Joint Mathematics Meetings.
- August 2013 *Connectivity in Semialgebraic Sets*. Preliminary Exam, North Carolina State University.
- May 2012 *Connectivity in Semialgebraic Sets*. Poster, East Coast Computer Algebra Day, Oakland University.

- October 2011 *Connectivity in Semialgebraic Sets*. Minisymposium talk, SIAM Conference on Applied Algebraic Geometry, North Carolina State University.
- September 2011 *Connectivity in Semialgebraic Sets*. Seminar talk, Symbolic Computation Seminar, North Carolina State University.
- June 2009 *On the Solution to the Nonlinear Resource Allocation Problem Using Variable Fixing and Interior Point Methods*. Master's project defense, Miami University.
- May 2007 *The SIAM 100.0000000-Digit Challenge: A Study in High Accuracy Numerical Computing Using Interval Analysis and Mathematica*. Senior thesis defense, College of Wooster.
- March 2007 *Self-similar tilings of nilpotent Lie groups*. Colloquium, College of Wooster.
- January 2007 *Self-similar tilings of nilpotent Lie groups*. AMS-MAA-SIAM Special Session on Research in Mathematics by Undergraduates (IV), Joint Mathematics Meetings.
- January 2007 *Self-similar tilings of nilpotent Lie groups*. MAA Undergraduate Poster Session, Joint Mathematics Meetings.

Conferences Attended

- January 2016 Joint Mathematics Meetings, Seattle, WA.
- August 2015 MAA MathFest, Washington, DC.
- April 2015 Allegheny Mountain Section Meeting, Washington & Jefferson University.
- September 2014 Annual Mathematics Conference on Optimization, Miami University.
- April 2014 East Coast Computer Algebra Day, Duke University.
- January 2014 Joint Mathematics Meetings, Baltimore, MD.
- January 2013 Joint Mathematics Meetings, San Diego, CA.
- May 2012 Michigan Computational Algebraic Geometry Meeting, Oakland University.
- May 2012 East Coast Computer Algebra Day, Oakland University.
- October 2011 SIAM Conference on Applied Algebraic Geometry, North Carolina State University.
- January 2007 Joint Mathematics Meetings, New Orleans, LA.

Honors, Awards, and Scholarships

- April 2015 Support from the West Liberty Office of Institutional Advancement for MAA Project NExT (\$3975).
- November 2013 AMS Student Travel Grant for Joint Mathematics Meetings.
- Fall 2013 Office of Faculty Development "Thank-A-Teacher" Recipient.
- Summer 2013 NSF Support for mentoring the Research Experience for Early Graduate Students program, North Carolina State University.
- Spring 2013 Outstanding Teaching Assistant Award, North Carolina State University.
- May 2012 Travel grant for East Coast Computer Algebra Day, Oakland University.
- Summer 2011 NSF Support for mentoring the Research Experience for Early Graduate Students program, North Carolina State University.

- Summer 2010 NSF Support for Research Experience for Early Graduate Students, North Carolina State University.
- 2009 – 2014 Graduate Assistantship, North Carolina State University.
- May 2008 Inducted to Pi Mu Epsilon (Mathematics Honor Society), Miami University.
- 2007 – 2009 Graduate Assistantship, Miami University.
- May 2007 Inducted to Phi Beta Kappa (Honor Society), College of Wooster.
- January 2007 NSF Student Travel Grant for Joint Mathematics Meetings.
- Summer 2006 NSF support for Research Experience for Undergraduates, University of Akron.
- 2003 – 2007 Academic Achievement Scholarship, College of Wooster.

University Service

- 2016 – Present President's Council on Sustainability.
- January 2016 Undergraduate Poster Session Judge at Joint Mathematics Meetings.
- 2014 – Present Calculus and Pre-Calculus Coordinator.
- 2014 – Present Maintain West Liberty's Department of Natural Science & Mathematics Web Page.
- 2014 – Present NASA West Virginia Space Grant Consortium Committee.

Memberships

- Mathematical Association of America.
- Allegheny Mountain Section NExT.
- Phi Beta Kappa.
- Pi Mu Epsilon.