

# Paul S. Wenger

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## Appointments:

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| 8/2012-Present | Assistant Professor,<br>School of Mathematical Sciences,<br>Rochester Institute of Technology.                          |
| 8/2010-6/2012  | Assistant Research Professor,<br>Department of Mathematical and Statistical Sciences,<br>University of Colorado Denver. |

## Education:

- University of Illinois at Urbana-Champaign, Doctorate of Philosophy in Mathematics, 2010  
Advisor: Douglas B. West
- University of Illinois at Urbana-Champaign, Master of Science in Mathematics, 2007
- Boston College, B.A. in Mathematics, Minor in Music, 2004, *Summa Cum Laude*

## Research Interests:

Extremal graph theory and structural graph theory. In particular, graph saturation, potential problems for graphic sequences, the cycle structure of graphs, acquisition parameters in graphs, and graph representations.

## Publications:

\* denotes graduate student coauthors, \*\* denotes undergraduate coauthors, \*\*\* denotes high school teacher coauthors

### Refereed Journal Papers

- (22) Catherine Erbes\*, Michael Ferrara, Ryan Martin, and Paul S. Wenger, On the shape of degree sequences that are not potentially  $H$ -graphic, to appear in *Journal of Combinatorics*.
- (21) Michael Barrus, Michael Ferrara, Jennifer Vandebussche, and Paul S. Wenger, Colored saturation parameters for rainbow subgraphs, *Journal of Graph Theory*, 86 (2017), no. 4., 375–386.
- (20) Eric Peterson\* and Paul S. Wenger, Unit hypercube visibility numbers of graphs, *Graphs and Combinatorics*, 33 (2017), no. 4, 1023–1035.
- (19) Poppy Immel\*\* and Paul S. Wenger, The List Distinguishing Number Equals the Distinguishing Number for Interval Graphs, *Discussiones Mathematicae Graph Theory*, 37 (2017), 165–174.
- (18) Kolja Knauer, Petru Valicov, and Paul S. Wenger, Planar digraphs with large acyclic sets *Journal of Graph Theory*, 85 (2017), no. 1, 288–291.
- (17) Paul S. Wenger and Douglas B. West, Uniquely cycle-saturated graphs, *Journal of Graph Theory*, 85 (2017), no. 1, 94–106.

- (16) Eric Sullivan\* and Paul S. Wenger, Saturation numbers in tripartite graphs, *Journal of Graph Theory*, 84 (2017), no. 4, 428–442.
- (15) Emily Gaub\*\*, Michelle Rose\*\*, and Paul S. Wenger, The unit bar visibility number of a graph, *Journal of Graph Algorithms and Applications*, 20 (2016), no. 2, 269–297.
- (14) Michael Ferrara, Timothy D. LeSaulnier, Casey Moffatt\*, and Paul S. Wenger, On the sum necessary to ensure that a degree sequence is potentially  $H$ -graphic, *Combinatorica*, 36 (2016), no. 6, 687–702.
- (13) Michael Ferrara, Michael S. Jacobson, Florian Pfender, and Paul S. Wenger, Graph saturation in multipartite graphs, *Journal of Combinatorics*, 7 (2016), no. 1, 1–19.
- (12) Paul S. Wenger, Fractional acquisition in graphs, *Discrete Applied Mathematics*, 178 (2014), 142–148.
- (11) Paul S. Wenger, A note on the saturation number of the family of  $k$ -connected graphs, *Discrete Mathematics*, 383 (2014), 81–83.
- (10) Lori MacDonald\*\*\*, Paul S. Wenger, and Scott Wright\*\*\*, Total acquisition on grids, *Australasian Journal of Combinatorics*, 58 (2014), no. 1, 137–156.
- (9) Timothy D. LeSaulnier, Noah Prince, Paul S. Wenger, Douglas B. West, and Pratik Worah, Total acquisition in graphs, *SIAM Journal on Discrete Mathematics*, 27 (2013), no. 4, 1800–1819.
- (8) Michael Ferrara, Ellen Gethner, Stephen Hartke, Derrick Stolee, and Paul S. Wenger, List distinguishing parameters of trees, *Discrete Applied Mathematics*, 161 (2013), no. 6, 864–869.
- (7) Michael Ferrara, Colton Magnant, and Paul S. Wenger, Conditions for families of disjoint  $k$ -connected subgraphs in a graph, *Discrete Mathematics*, 313 (2013), no. 6, 760–764.
- (6) Michael Ferrara, Timothy Morris\*, and Paul S. Wenger, Pancyclicity of 4-connected, claw-free,  $P_{10}$ -free graphs, *Journal of Graph Theory*, 71 (2012), no. 4, 435–447.
- (5) Michael Ferrara, Michael S. Jacobson, Kevin G. Milans, Craig Tennenhouse, and Paul S. Wenger, Saturation numbers for families of graph subdivisions, *Journal of Graph Theory*, 71 (2012), no. 4, 416–434.
- (4) Jennifer Diemunsch\*, Michael Ferrara, Allan Lo, Casey Moffatt\*, Florian Pfender, and Paul S. Wenger, Rainbow matchings of size  $\delta(G)$  in properly edge-colored graphs, *Electronic Journal of Combinatorics*, 19 (2012), no. 2, #P52.
- (3) Joshua Cooper, John Lenz, Timothy D. LeSaulnier, Paul S. Wenger, and Douglas B. West, Uniquely  $C_4$ -saturated graphs, *Graphs and Combinatorics*, 28 (2012), no. 2, 189–197.
- (2) Timothy D. LeSaulnier, Christopher Stocker, Paul S. Wenger, and Douglas B. West, Rainbow matching in edge-colored graphs, *Electronic Journal of Combinatorics*, 12 (2010), no. 1, Note 26.
- (1) Stephen G. Hartke, Jennifer Vandenbussche, and Paul S. Wenger, Further results on bar  $k$ -visibility graphs, *SIAM Journal on Discrete Mathematics*, 21 (2007), 523–531.

### Submitted

- (5) Caroline Accurso\*\*, Vitaly Chernyshov\*\*, Leaha Hand\*\*, Sogol Jahanbekam, and Paul S. Wenger, Weak dynamic colorings of planar graphs. (2018)
- (4) Michael Ferrara, Zoltán Füredi, Sogol Jahanbekam, and Paul S. Wenger, List-distinguishing Cartesian products of cliques, under review at *The Electronic Journal of Combinatorics*. (2017)
- (3) Catherine Erbes, Michael Ferrara, Ryan Martin, and Paul S. Wenger, Stability of the potential function, under review at *SIAM Journal on Discrete Mathematics*. (2016)

- (2) Michael Ferrara, Ellen Gethner, Stephen Hartke, Derrick Stolee, and Paul S. Wenger, Extending precolorings to distinguish group actions, under review at *European Journal of Combinatorics*. (2014)
- (1) Catherine Erbes\*, Michael Ferrara, Ryan Martin, and Paul S. Wenger, On the shape of degree sequences that are not potentially  $H$ -graphic, under review at *Journal of Combinatorics*. (2013)

### Conference Papers

- (3) Nathan Cahill, Harmeet Singh\*, Chao Zhang\*, Daryl Corcoran\*, Alison Prengaman\*, Paul Wenger, John Hamilton, Peter Bajorski, and Andrew Michael, Multiple-View Spectral Clustering for Group-wise Functional Community Detection, MICCIA Workshop on Brain Analysis using Connectivity Networks, October 2016.
- (2) Nathan Cahill, Selene Chew\*\*, and Paul S. Wenger, Spatial-spectral dimensionality reduction of hyperspectral imagery with partial knowledge of class labels, *Proc. SPIE Defense + Security: Algorithms and Technologies for Multispectral, Hyperspectral, and Ultraspectral Imagery XXI*, April 2015.
- (1) Amanda K. Ziemann\*, David W. Messinger, and Paul S. Wenger, An adaptive  $k$ -nearest neighbor graph building technique with applications to hyperspectral imagery, *Proc. IEEE Western New York Image and Signal Processing Workshop*, November 2014.

### Funding:

#### Principal Investigator Funded Grants:

- *Collaborative Research: Data integration in Undergraduate Mathematics Education*, NSF IUSE, \$253,052, July 2017–June 2020.
- *Doceamus: the Pedagogical Mentorship Group in Mathematics*, RIT Provost’s Office Faculty Mentoring Grant, \$300. November 2016 – June 2017.
- *Doceamus: the Pedagogical Mentorship Group in Mathematics*, RIT Provost’s Office Faculty Mentoring Grant, \$1,100. November 2015 – June 2016.
- *Seed funding for the multipartite saturation project*, Dean’s Research Initiation Grant, \$14,362. October 2013–August 2014.
- *Toward a unified view of saturated graphs*, Grant Writers’ Boot Camp Seed Funding Award, \$4,739. March 2013–August 2013.

#### Travel Funding:

- EXCILL III: Extremal Combinatorics at Illinois, August 8-10, 2016. \$400.

#### Senior Personnel Funded Grants:

- *NSF-REU Site in Extremal Graph Theory and Dynamical Systems*, National Science Foundation, \$287,556. March 1, 2017–May 31, 2020.
- *NSF-REU Site in Extremal Graph Theory and Dynamical Systems*, National Science Foundation, \$287,848. March 1, 2014–May 31, 2017.

### Student and Research Supervision

#### Master’s Students:

- (4) Anna Raleigh, Applied and Computational Mathematics, Rochester Institute of Technology, expected in Spring 2018.  
Chromatic villainy of graphs.  
Co-advised with Sogol Jahanbekam.

- Supported by College of Science Summer Undergraduate Research Fellowship (2017).
- (3) Eric Peterson, Applied and Computational Mathematics, Rochester Institute of Technology, 2016.  
Rectangle visibility number of graphs.
  - (2) Christine Van Oostendorp, Applied and Computational Mathematics, Rochester Institute of Technology, 2016.  
Colored saturation problems in bipartite graphs.
  - (1) Eric Sullivan, Applied and Computational Mathematics, Rochester Institute of Technology, 2014.  
Saturation in multipartite graphs.

### **Undergraduate Student Research:**

- (6) Kristopher Siy (Tufts University) and Heather Weaver (Case Western Reserve University), Summer 2016.  
Saturation multiplicity of trees.  
Supported by Research Experience for Undergraduates at RIT.
- (5) Samuel Kilgore, Rochester Institute of Technology, Spring 2016–Present.  
Lubell saturation parameters of posets.
- (4) Anna Raleigh and Frederick Johnson, Rochester Institute of Technology, Spring 2016–Present.  
Unit acquisition numbers of graphs.
- (3) Poppy Immel, Rochester Institute of Technology, summer 2015.  
Distinguishing parameters of interval graphs and  $k$ -trees.  
Supported by College of Science Summer Undergraduate Research Fellowship
- (2) Emily Gaub (Pacific University) and Michelle Rose (Mount St. Mary's University), summer 2014.  
The unit bar visibility number of graphs.  
Supported by Research Experience for Undergraduates at RIT.
- (1) Matthew Howell, Rochester Institute of Technology, 2012-2013.  
Total acquisition on hexagonal grids.

### **Independent Studies**

- (5) Galois Theory, Spring 2016, three students.
- (4) Christine van Oostendorp, Rainbow Saturation Numbers in Bipartite Graphs, Spring 2015.
- (3) Eric Peterson, Rectangle Visibility Numbers of Graphs, Spring 2015.
- (2) Poppy Immel, The Distinguishing Number of Graphs, Spring 2015.
- (1) Poppy Immel, The Distinguishing Number of Graphs, Fall 2014.

### **Other Research Projects:**

- (1) Lori MacDonald and Scott Wright, Research Experience for Teachers in the Rocky Mountain Middle School Math Science Partnership, Summer 2012.  
Acquisition parameters on grids.

### **Doctoral Committees:**

- (5) Amanda K. Ziemann, Imaging Science, Rochester Institute of Technology, 2015.
- (4) Jennifer Diemunsch, Applied Mathematics, University of Colorado Denver, 2015.
- (3) Catherine Erbes, Applied Mathematics, University of Colorado Denver, 2014.
- (2) Timothy Morris, Applied Mathematics, University of Colorado Denver, 2014.
- (1) James A. Albano, Imaging Science, Rochester Institute of Technology, 2013.

**Comprehensive Exam Committees:**

- (6) Casey Moffatt, Applied Mathematics, University of Colorado Denver, 2013.
- (5) Jennifer Diemunsch, Applied Mathematics, University of Colorado Denver, 2013.
- (4) Catherine Erbes, Applied Mathematics, University of Colorado Denver, 2012.
- (3) Deborah Arangno, Applied Mathematics, University of Colorado Denver, 2012.
- (2) Samantha Graffeo, Applied Mathematics, University of Colorado Denver, 2011.
- (1) Timothy Morris, Applied Mathematics, University of Colorado Denver, 2011.

**Master's Thesis Committees:**

- (2) Juan Johnson, Applied and Computational Mathematics, Rochester Institute of Technology, October 2016.
- (1) Brian Ek, Applied and Computational Mathematics, Rochester Institute of Technology, June 2014.

**Teaching Experience****Rochester Institute of Technology**

- Project-Based Calculus I (Math-181): Fall 2017
- Discrete Mathematics and Introduction to Proofs (Math-200): Fall 2016
- Graduate Graph Theory (Math-645): Fall 2016
- Abstract Algebra I (Math-441): Fall 2015
- Graduate Combinatorics (Math-646): Spring 2015
- Graph Theory (Math-351): Fall 2014
- Discrete Mathematics for Computing (Math-190): Fall 2014, Spring 2015, Summer 2015, Fall 2015, Spring 2016
- Advanced Linear Algebra (Math-341): Spring 2014, Spring 2016
- Linear Algebra (Math-241): Spring 2014, Fall 2013
- Discrete Mathematics II (1016-366): Spring 2013, Winter 2012-13
- Discrete Mathematics I (1016-265): Fall 2012

**University of Colorado Denver:**

- Discrete Modeling (Math 4793/5793)
- College Algebra (Math 1110)
- Graduate Applied Graph Theory (Math 6404)
- Calculus II (Math 2411)
- Graduate Topics in Algebraic Graph Theory (Math 7823)
- Introductory Statistics (Math 2830)
- Differential Equations and Linear Algebra (Math 3195)
- College Algebra for Social Science and Business (Math 1070)

**Outreach Activities**

- One Universe at a Time podcast. September 30, 2015.
- Rochester Science Cafe: What does it mean to do mathematical research? March 24, 2015. Approximately 60-70 attendees.
- Math in the Movies: Good Will Hunting, March 18, 2015. 22 students.
- Escaping the Executioner: RIT College & Careers, July 19, August 2, 2014. 52 students.
- How Precalculus Saved My Dissertation, Toyota-RIT applied Math Initiative, July 1, 2014.

- Presentation to Rochester Public Schools math teachers in preparation for the Math Midway exhibit at the Rochester Museum and Science Center, November 23, 2013.
- Discrete Math: Counting the Probabilities, Rocky Mountain Middle School Math and Science Partnership course, Summer 2011.
- Math Teacher Preparation Workshop for the Denver Teaching Fellows, Spring 2011.
- Outreach presentations to elementary, middle, and high school students:
  - Fractals. Heron Pond Elementary School, Milford, NH, June 5, 2014. 22 Students.
  - Utilities, Farmers, and Planar Graphs, STEM Magnet Lab, Northglenn, CO, February 28, 2012. 20 Students.
  - Combinatorial Games and Fractals, Heron Pond Elementary School, Milford, NH, December 23, 2011. 25 Students.
  - Combinatorial Games Captain Samuel Douglas Academy, Brookline, NH, December 23, 2011. 19 Students.
  - Fractals, Combinatorial Games, and Fair Division. Brighton East Charter School, Brighton, CO, December 15, 2011. 140 students.
  - Combinatorial Games, Bennett High School, Bennett, CO, Spring 2011. 60 students.
  - Instant Insanity and Mathematical Card Tricks. West Middle School, Aurora, CO, December 2010. 60 students.

## Departmental Service

- School of Mathematical Sciences Strategic Planning Committee. Fall 2016-present.
- Co-organizer of the SMS Pedagogical Discussion Group, supported by three Provost's RIT Faculty Mentoring Grant (\$2000, \$1100, \$300). Spring 2015-Present.
- Undergraduate Curriculum Committee, 2012-2013, 2014-present.
- Co-adviser of PiRIT, the RIT Mathematics Club, 2014-2017.
- Ad hoc Academic Affairs Committee, 2016
- Ph.D. Development Committee, 2012-2015.
- Course Coordinator, Linear Algebra, Fall 2013-Fall 2014.
- Committee on Portfolios, 2014.

## Professional Service

- Co-organizer of Special Session on Advanced Techniques in Graph Theory, 2017 Fall Eastern AMS Sectional Meeting, State University of New York at Buffalo.
- Co-organizer of Special Session on New Advances in Graph Theory, 2012 Fall Eastern AMS Sectional Meeting, Rochester Institute of Technology.
- Referee of 31 journal articles for 17 different journals: *European Journal of Combinatorics* (1), *SIAM Journal on Discrete Mathematics* (1), *Journal of Graph Theory* (3), *Journal of Combinatorics* (1), *The Electronic Journal of Combinatorics* (2), *Discrete Mathematics* (7), *Graphs and Combinatorics* (3), *Discrete Applied Mathematics* (1), *Journal of Combinatorial Optimization* (2), *Ars Combinatoria* (2), *Australasian Journal of Combinatorics* (1), *Utilitas Mathematica* (1), *Discussiones Mathematicae Graph Theory* (2), *Journal of Combinatorial Mathematics and Combinatorial Computing* (1), *Journal of Graph Algorithms and Applications* (1), *Theory and Applications of Graphs* (1), *PRIMUS* (1).
- Reviewer for Mathematical Reviews, 21 articles.
- Judge: Illinois Council of Teachers of Mathematics Regional Competition.

## Awards:

- RIT College of Science Collegiality Award, 2016.
- Finalist for Richard and Virginia Eisenhart Provost's Award for Excellence in Teaching at Rochester Institute of Technology, 2015-2016.
- RIT College of Science "Fun Outside the Classroom" Award for leading and supporting extracurricular activities, 2015.
- University of Illinois Department of Mathematics Teaching Assistant Award, 2010.
- University of Illinois "List of Teachers Rated Excellent By Their Students": Spring 2010, Fall 2009 (Rated Outstanding) Fall 2008, Fall 2007 (Rated Outstanding), Spring 2007, Fall 2006, Spring 2006 (Rated Outstanding), Fall 2005 (Rated Outstanding).
- Finalist for University of Illinois Department of Mathematics Teaching Assistant Award, 2009.
- VIGRE Graduate Fellowship, University of Illinois at Urbana-Champaign, 2004.

## Presentations:

- (29) *The Asymptotic Behavior of the Potential Function*, 2018 International Workshop on Graph Theory, Ewha Womans University, Seoul, January 4, 2018 (**Invited**).
- (28) *Precoloring Extensions for Distinguishing Coloring*, 2016 AMS Fall Western Section Meeting, Denver, CO, October 8, 2016 (**Invited**).
- (27) *The Asymptotic Behavior of the Potential Function*, 2016 AMS Fall Eastern Section Meeting, Brunswick, ME, September 25, 2016 (**Invited**).
- (26) *Saturation Multiplicity of Graphs*, SIAM Conference on Discrete Mathematics, Atlanta, GA, June 8, 2016.
- (25) *Saturation Multiplicity of Graphs*, 2016 AMS Spring Central Section Meeting, Fargo, ND, April 16, 2016 (**Invited**).
- (24) *Uniquely Cycle-Saturated Graphs*, Miami University Annual Mathematics Conference: Combinatorics and its Applications, September 25, 2015.
- (23) *The Rainbow Saturation Number of Graphs*, 2015 AMS Spring Western Section Meeting, Las Vegas, NV, April 18, 2015 (**Invited**).
- (22) *The Rainbow Saturation Number of Graphs*, University of Colorado Denver Discrete Mathematics Seminar, November 11, 2014 (**Invited**).
- (21) *Unique Saturation and Eigenvalue Methods for Graphs*, Mathematics Colloquium, SUNY Geneseo, October 30, 2014 (**Invited**).
- (20) *The Rainbow Saturation Number of Graphs*, Discrete Mathematics Days of the Northeast, Middlebury, VT, September 20, 2014 (**Invited**).
- (19) *The Asymptotic Behavior of the Potential Function*, SIAM Conference on Discrete Mathematics, Minneapolis, MN, June 19, 2014 (**Invited**).
- (18) *Graph Saturation in Multipartite Graphs*, Iowa State University Discrete Mathematics Seminar, February 25, 2014 (**Invited**).
- (17) *Saturated Subgraphs of Multipartite Graphs*, CanaDAM 2013, St. John's, NL, Canada, June 10, 2013.
- (16) *The Saturation Number of  $k$ -Connected Graphs*, University of Colorado Denver Discrete Mathematics Seminar, May 6, 2013 (**Invited**).
- (15) *Saturated Subgraphs of Multipartite Graphs*, 2013 AMS Spring Western Section Meeting, Boulder, CO, April 14, 2013 (**Invited**).

- (14) *The Asymptotics of the Potential Function*, 2012 AMS Fall Central Section Meeting, Akron, OH, October 21, 2012 (**Invited**).
- (13)  $\delta(G)$ -Size Rainbow Matchings in Properly Edge-Colored Graphs, 2011 AMS Fall Central Section Meeting, Lincoln, NE, October 15, 2011 (**Invited**).
- (12) *Saturation Numbers for Families of Subdivisions*, MAA Rocky Mountain Section Meeting, Boulder, CO, April 8, 2011.
- (11) *Uniquely H-Saturated Graphs*, Rocky Mountain Algebraic Combinatorics Seminar, Colorado State University, February 25, 2011 (**Invited**).
- (10) *Combinatorial Structures, Unique Saturation, and Eigenvalue Methods*, Mathematics Colloquium, University of Nebraska-Lincoln, February 7, 2011 (**Invited**).
- (9) *Saturation Numbers for Families of Subdivisions*, 2011 Joint Mathematics Meeting, New Orleans, LA, January 9, 2011 (**Invited**).
- (8) *Uniquely H-Saturated Graphs*, 23rd Cumberland Conference, University of Mississippi, May 20, 2010.
- (7) *Cycle Saturation in Graphs*, Illinois State University Discrete Mathematics Seminar, February 25, 2010 (**Invited**).
- (6) *Uniquely H-Saturated Graphs*, 2010 Joint Mathematics Meeting, San Francisco, CA, January 16, 2010.
- (5) *Uniquely H-Saturated Graphs*, University of Colorado Denver Graph Theory Seminar, November, 2009 (**Invited**).
- (4) *Acquisition Parameters in Graphs*, 2009 SIAM Annual Meeting, Denver, Co, July 9, 2009 (**Invited**).
- (3) *Acquisition Parameters in Graphs*, 22nd Cumberland Conference, Western Kentucky University, May 21, 2009.
- (2) *Acquisition Parameters in Graphs*, MIGHTY XLVII, Illinois Institute of Technology, November 8, 2008.
- (1) *Further Results on Bar k-Visibility Graphs*, 20th Cumberland Conference, Emory University, May, 2007.