Jeffrey Mudrock
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EDUCATION

Illinois Institute of Technology Spring 2018
Doctor of Philosophy in Applied Mathematics
- Area of Concentration: Discrete Applied Mathematics
- Thesis Title: On the list coloring problem and its equitable variants,
  Adviser: Hemanshu Kaul

University of Illinois at Urbana-Champaign Spring 2011
Master of Science in the Teaching of Mathematics, (GPA: 4.00/4.00)

University of Illinois at Urbana-Champaign Spring 2010
Bachelor of Science in Mathematics, (GPA: 4.00/4.00)
- Minor: Secondary Education (Obtained type 09 teacher certification)

EMPLOYMENT

University of South Alabama
- Assistant Professor of Mathematics Fall 2023-present

College of Lake County
- Professor of Mathematics Fall 2017-Summer 2023
- Associate Professor of Mathematics Fall 2016-Spring 2017
- Assistant Professor of Mathematics Fall 2014-Spring 2016
- Mathematics Instructor Fall 2012-Spring 2014
- Adjunct Instructor Fall 2011

Illinois Institute of Technology
- Visiting Associate Professor Fall 2019-Spring 2020

Elgin Community College
- Adjunct Instructor Fall 2011

Kankakee Community College
- Adjunct Instructor Summer 2011

TEACHING EXPERIENCE

University of South Alabama
- *Undergraduate Research* taught 1 time, *Foundations of Mathematics* taught 2 times, *Discrete Mathematics* taught 1 time, *Linear Algebra* taught 1 time, and *Precalculus Algebra* taught 1 time

College of Lake County
- *Special Topics in Mathematics* taught 15 times, *Discrete Mathematics* taught 4 times, *Linear Algebra* taught 1 time, *Calculus and Analytic Geometry III* taught 17 times, *Calculus and Analytic Geometry II* taught 14 times, *Calculus and Analytic Geometry I* taught 8 times, *Precalculus* taught 5 times, *Trigonometry* taught 2 times, *Business Statistics* taught 3 times, *Contemporary Mathematics* taught 1 time, *Intermediate Algebra* taught 3 times, *Intermediate Algebra A* taught 4 times, and *Basic Algebra* taught 1 time

Elgin Community College

- *Math for Elementary Teachers II* taught 1 time and *Finite Mathematics* taught 1 time

Kankakee Community College

- *Calculus and Analytic Geometry II* taught 1 time

Illinois Institute of Technology, *Graduate Teaching Assistant*   Spring 2012

- Graded and held office hours for two Differential Equations courses
- Graded and held office hours for a Combinatorics course

University of Illinois, *Graduate Teaching Assistant*

- Taught two discussion sections of a course for middle school teachers   Spring 2011
- Taught one discussion section of Multivariable Calculus   Fall 2010

RESEARCH

Research Interests
Algebraic Combinatorics, Enumerative Combinatorics, Probabilistic Combinatorics, Graph Theory

Submitted Works
1. "A polynomial method for counting colorings of S-labeled graphs", with S. Dahlberg and H. Kaul.
2. "DP-coloring of graphs from random covers", with A. Bernshteyn, D. Dominik, and H. Kaul.
3. "An algebraic approach for counting DP-3-colorings of sparse graphs", with S. Dahlberg and H. Kaul.
4. "Flexible list colorings: maximizing the number of satisfied requests", with H. Kaul, R. Mathew, and M. Pelsmajer.
5. "The DP color function of clique-gluings of graphs", with H. Kaul, M. Maxfield, and S. Thomason.
6. "On polynomial representations of the DP color function: theta graphs and their generalizations", with C. Halberg, H. Kaul, A. Liu, P. Shin, and S. Thomason.
7. "On the list color function threshold", with H. Kaul, A. Kumar, P. Rewers, P. Shin, and K. To.

Published Works
8. "Bounding the list color function threshold from above", with H. Kaul, A. Kumar, A. Liu, P. Rewers, P. Shin, M. S. Tanahara, and K. To, *Involve*, 16(5) (2023), 849-882.
9. "A short proof that the list packing number of any graph is well defined", *Discrete Mathematics,* 346(11) (2023) 113185.
10. "DP-coloring Cartesian products of graphs", with H. Kaul, G. Sharma, and Q. Stratton, *Journal of Graph Theory*, 103(2) (2023) 285-306.
11. "Non-chromatic-adherence of the DP color function via generalized theta graphs", with M. V. Bui, H. Kaul, M. Maxfield, P. Shin, and S. Thomason, *Graphs and Combinatorics*, 39 (2023) no. 3, 42.
12. "On the equitable choosability of the disjoint union of stars", with H. Kaul and T. Wagstrom, *Graphs and Combinatorics*, 38 (2022) no. 5, 163.
13. "The DP color function of joins and vertex-gluings of graphs", with J. Becker, J. Hewitt, H. Kaul, M. Maxfield, D. Spivey, S. Thomason, and T. Wagstrom, *Discrete Mathematics*, 345 (2022) 113093.
14. "A deletion-contraction relation for the DP color function", *Graphs and Combinatorics*, 38 (2022) no. 4, 115.

15. "On proportional 2-choosability with a bounded palette", with R. Piechota, P. Shin, and T. Wagstrom, *Graphs and Combinatorics*, 38 (2022) no. 1, 23.
16. "On equitable list arboricity of graphs", with H. Kaul and M. Pelsmajer, *Australasian Journal of Combinatorics*, 80 (2021) 419-441.
17. "Criticality, the list color function, and list coloring the Cartesian product of graphs", with H. Kaul, *Journal of Combinatorics*, 12 (2021) 479-514.
18. "On list equitable total colorings of the generalized theta graph", with M. Marsh and T. Wagstrom, *Discussiones Mathematicae Graph Theory*, 41 (2021) 1215-1233.
19. "A note on the equitable choosability of complete bipartite graphs", with M. Chase, I. Kadera, E. Thornburgh, and T. Wagstrom, *Discussiones Mathematicae Graph Theory*, 41 (2021) 1091-1101.
20. "Answers to two questions on the DP color function", with S. Thomason, *The Electronic Journal of Combinatorics*, 28 (2021) P2.24.
21. "Partial DP-coloring", with H. Kaul and M. Pelsmajer, *Discrete Mathematics*, 344 (2021) 112306.
22. "On the chromatic polynomial and counting DP-colorings", with H. Kaul, *Advances in Applied Mathematics*, 123 (2021) 102131.
23. "Proportional choosability of complete bipartite graphs", with J. Hewitt, P. Shin, and C. Smith, *Graphs and Combinatorics,* 37 (2021) 381-392.
24. "Combinatorial nullstellensatz and DP-coloring of graphs", with H. Kaul, *Discrete Mathematics*, 343 (2020) 112115.
25. "A simple characterization of proportionally 2-choosable graphs", with H. Kaul, M. Pelsmajer, and B. Reiniger, *Graphs and Combinatorics,* 36 (2020) 679-687.
26. "List coloring a Cartesian product with a complete bipartite factor", with H. Kaul, *Graphs and Combinatorics,* 35 (2019) 1571-1583.
27. "Proportional choosability: a new list analogue of equitable coloring", with H. Kaul, M. Pelsmajer, and B. Reiniger, *Discrete Mathematics*, 342 (2019) 2371-2383.
28. "On the Alon-Tarsi number and chromatic-choosability of Cartesian products of graphs", with H. Kaul, *The Electronic Journal of Combinatorics*, 26 (2019) P1.3.
29. "Total equitable list coloring", with H. Kaul and M. Pelsmajer, *Graphs and Combinatorics*, 34 (2018) 1637-1649.
30. "A note on the DP-chromatic number of complete bipartite graphs", *Discrete Mathematics*, 341 (2018) 3148-3151.
31. "On lambda-fold Rosa-type labelings of bipartite multigraphs", with R. C. Bunge, S. I. El-Zanati, C. Vanden Eynden, and W. Wannasit, *Electronic Notes in Discrete Mathematics*, 60 (2017) 11-23.
32. "On labeling 2-regular graphs where the number of odd components is at most 2", with R. C. Bunge, S. I. El-Zanati, M. Hirsch, D. Klope, K. Sebesta, and B. Shafer, *Utilitas Mathematica*, 91 (2013) 261-285.
33. "An observation on generating functions with an application to a sum of secant powers", *Involve*, 4 (2012) 117-125.
34. "On cyclic decompositions of circulant graphs into almost-bipartite graphs", with S. I. El-Zanati and K. King, *Australasian Journal of Combinatorics*, 49 (2011) 61-76.

SUPERVISED STUDENT RESEARCH PROJECTS

Daniel Dominick, Gunjan Sharma, and Quinn Stratton (Illinois Tech Graduates)
- Conducted research on DP-coloring   Fall 2019-present

Kennedy Cano, Emily Gutknecht, Gautham Kappaganthula, George Miller, and Ezekiel Thornburgh (College of Lake County Undergraduates)
- Conducted research on chromatic-choosability   Summer 2022- Summer 2023

Akash Kumar, Andrew Liu, Patrick Rewers, Paul Shin, Michael Tanahara, and Khue To
(College of Lake County Undergraduates)
- Conducted research on the list color function   Summer 2021-Spring 2022

Jack Becker, Vu Bui, Michael Maxfield, Paul Shin, Seth Thomason, and Tim Wagstrom
(College of Lake County Undergraduates)
- Conducted research on the DP color function of graph gluings   Summer 2020-Summer 2021

Seth Thomason (College of Lake County Undergraduate)
- Conducted research on the asymptotics of the DP color function   Summer 2020

Jade Hewitt, David Spivey, and Seth Thomason (College of Lake County Undergraduates)
- Conducted research on the DP color function of joins of graphs   Summer 2020

Charlie Halberg, Andrew Liu, Paul Shin and Seth Thomason
(College of Lake County Undergraduates)
- Conducted research on the DP color function of theta graphs   Summer 2020

Tim Wagstrom (University of Illinois at Chicago Undergraduate)
- Conducted research on the equitable choosability of stars   Spring 2020-Summer 2020

Jade Hewitt, Paul Shin, and Collin Smith (College of Lake County Undergraduates)
- Conducted research on proportional choosability of bipartite graphs   Fall 2019-Spring 2020

Robert Piechota, Paul Shin, and Tim Wagstrom (College of Lake County Undergraduates)
- Conducted research on proportional choosability with a bounded palette   Summer 2019

Max Marsh and Tim Wagstrom (College of Lake County Undergraduates)
- Conducted research on the list equitable total coloring conjecture   Spring 2019

Madelynn Chase, Isaac Kadera, Martin Maillard, Tim Wagstrom, and Ezekiel Thornburgh
(College of Lake County Undergraduates)
- Conducted research on equitable choosability   Summer 2018-Fall 2018

INVITED TALKS

University of Colorado Denver
- Discrete Seminar   March 2024

Atlantic Association for Research in the Mathematical Sciences
- Atlantic Graph Theory Seminar   Oct. 2023

American Mathematical Society
- Special Session on Recent Progress in Chromatic Graph Theory   April 2023
- Special Session on Enumerative and Extremal Problems in Chromatic Graph Theory   May 2022
- Special Session on Topics in Extremal and Structural Graph Theory   Nov. 2019

University of Illinois at Urbana-Champaign
- Graph Theory and Combinatorics Seminar   Feb. 2018

CONTRIBUTED TALKS

University of South Alabama Colloquium/Seminar
- "An algebraic approach to counting colorings of S-labeled graphs"   Nov. 2023
- "Let's color!"   Sept. 2023

Illinois Institute of Technology Discrete Applied Math Seminar
- "On chromatic polynomials, list color functions, and DP color functions"   Feb. 2022
- "Counting DP colorings: Problems and Progress"   March 2021
- "Combinatorial nullstellensatz and DP-coloring" (3 talks)   Feb. 2020
- "Partial DP-coloring"   Jan. 2020
- "On the chromatic polynomial and counting DP-colorings"   Aug. 2019
- "List coloring a Cartesian product with a complete bipartite factor"   Oct. 2018
- "Proportional choosability: a new list analogue of equitable coloring"   Feb. 2018
- "Strong equitable choosability of graphs"   Sept. 2017
- "On total equitable choosability"   April 2017
- "The list color function and chromatic-choosability"   March 2017
- "Using strong criticality and unique list colorability to bound the list   March 2016
  chromatic number of the Cartesian product of graphs"
- "Using the Alon-Tarsi theorem to bound the list chromatic number   Feb. 2016
  of the Cartesian product of an odd cycle and traceable graph"

58th Midwestern Graph Theory Conference
- "Strong equitable choosability of graphs"   Oct. 2017

30th & 34th Midwestern Conference on Combinatorics and Combinatorial Computing
- "The list color function threshold"   Oct. 2022
- "On strongly chromatic-choosable graphs with an application to list   Oct. 2016
  coloring the Cartesian product of graphs"

2011 REU at Illinois State University
- "On nearly graceful labelings of 2-regular graphs with two components"   July 2011

Joint Mathematics Meetings
- "On lambda-fold Rosa-type labelings"   Jan. 2010
- "On cyclically decomposing complete graphs into m-cycles and Hamilton cycles"   Jan. 2009

University of Illinois Mathematics Honorary Society   Oct. 2009
- "On cyclically decomposing complete graphs into m-cycles and
  Hamilton cycles and the REU at ISU experience"

PROFESSIONAL SERVICE

University of South Alabama, *Math Competition Assistant*   Fall 2023-present
- Helped train students for the Putnam Exam
- Helped with the development of problems for the Nash Math Competition
  and Mathematical Puzzle Program

University of South Alabama, *Curriculum Developer*   Fall 2023-present
- Helped develop the curriculum for an undergraduate graph theory course

Journal Refereeing   Summer 2017-present
- Advances in Applied Mathematics, Ars Mathematica Contemporanea,
  Discrete Applied Mathematics, Discrete Mathematics, Discussiones Mathematicae
  Graph Theory, Electronic Journal of Combinatorics, European Journal of
  Combinatorics, Graphs and Combinatorics, Journal of Combinatorial Theory
  Series B, Journal of Graph Theory, and Theoretical Computer Science

College of Lake County Math Department, *Link Crew Mentor*   Spring 2017-Summer 2023
- Mentored adjunct faculty

College of Lake County Math Center, *Faculty Coordinator*   Spring 2015- Summer 2023
- Helped to develop online tutoring and classroom tutoring

College of Lake County NSF Scholarship Program, *Adviser and Tutor*   Fall 2014- Summer 2023
- Tutored and advised engineering students receiving a scholarship
  through the National Science Foundation under Grant DUE-1153801
  and Grant DUE-1929983

College of Lake County Math Department, *Committee Member*   Spring 2013- Summer 2023
- Served on committees that determined curriculum and pacing of
  Intermediate Algebra A, Precalculus, Calculus III, Discrete
  Mathematics, and Linear Algebra

College of Lake County Math Club, *Faculty Adviser*   Fall 2012-Spring 2023
- Helped prepare students to compete in various math competitions

College of Lake County Faculty Senate, *Representative*   Fall 2014-Spring 2016

ICTM State Mathematics Competition, *Oral Judge*   2011-2014

HONORS

College of Lake County
- Outstanding Advisor Award   2023
- NISOD Teaching Excellence Award   2018
- Nominated for the NISOD Teaching Excellence Award   2016, 2017, 2018
- Nominated for the Outstanding Faculty Award   2013, 2014, 2015, 2017, 2018, 2019, 2020, 2022

Illinois Institute of Technology
- Karl Menger Student Award for Exceptional Scholarship   2018

University of Illinois
- List of Teachers Ranked as Excellent by Their Students   Fall 2010, Spring 2011
- summa cum laude   Spring 2010
- Bronze Tablet   Spring 2010

University of Illinois Mathematics Department
- Highest Distinction in Mathematics   Spring 2010
- Emily Mann Peck Scholarship   Spring 2010
- Most Outstanding Undergraduate in the Teaching of Mathematics   Spring 2009

University of Illinois College of Education
- William Chandler Bagley Award   Spring 2009

PARTICIPATION IN GROUPS

Illinois State University, *REU Participant*   Summer 2007, 2008, 2009
- Published original research in discrete mathematics
- Conducted research on student use of representations to problem solve

University of Illinois, *Putnam Exam Participant*   2006, 2007, 2008, 2009

TECHNOLOGICAL SKILLS

I am comfortable using the following technologies for teaching: Learning Management Systems (e.g., Blackboard, Canvas), Online Homework Systems (e.g., WebAssign, MyLab), MATLAB, Octave, Mathematica, Geometer's Sketchpad, Video Lecture Capture (e.g., Panopto, Zoom)