

Heather C. Smith

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My primary interests lie in combinatorics and graph theory. Current projects include topics of computational complexity, poset dimension theory, extremal problems on trees, and applications to biology.

Education

- Aug. 2010– **Ph.D. Student in Mathematics**
Aug. 2015 *University of South Carolina, Columbia, SC*
Dissertation: Trees, Partitions, and Other Combinatorial Structures
Advisor: László Székely
- Aug. 2008– **M.S. in Mathematics**
May 2010 *Virginia Commonwealth University, Richmond, VA*
Thesis: Zero Divisors among Digraphs
Advisor: Richard Hammack
- Aug. 2005– **B.A. in Mathematics**
May 2008 *Houghton College, Houghton, NY*
Summa Cum Laude
- Aug. 2005– **B.A. in Adolescence Education**
May 2008 *Houghton College, Houghton, NY*
Summa Cum Laude

Publications

In print

4. I. Miklós and H. Smith. "Sampling and counting genome rearrangement scenarios," *BMC Bioinformatics* 16(Suppl 14):S6 (2015). ([DOI:10.1186/1471-2105-16-S14-S6](https://doi.org/10.1186/1471-2105-16-S14-S6), 2015).
3. H. Smith, L. A. Székely, and H. Wang. "Eccentricity Sums in Trees," *Discrete Applied Mathematics* 207, (2016): 120-131.
2. H. Smith and L. A. Székely "Some Remarks on Baranyai's Theorem," *Congressus Numerantium* 222, (2014): 43-55.
1. R. Hammack and H. Smith. "Zero Divisors among Digraphs," *Graphs and Combinatorics* 30.1, (2014): 171-181. (*Published on-line DOI:10.1007/s00373-012-1248-x*, 2012)

Submitted

3. M. Ferrara, W. Kay, L. Kramer, R. Martin, B. Reiniger, H. Smith, and E. Sullivan. "The saturation number of induced subposets of the Boolean lattice," *Submitted*.
2. I. Miklós and H. Smith. "The computational complexity of calculating partition functions of optimal medians with Hamming distance," *Submitted*.
1. H. Smith, L. A. Székely, H. Wang, and S. Yuan. "On different 'middle parts' of a tree," *Submitted*.

In preparation

1. F. Barrera-Cruz, R. Garcia, P. Harris, B. Kubik, H. Smith, S. Talbott, L. Taylor, W. T. Trotter. "The graph of critical pairs of a crown," *In preparation*.

Academic Positions

Georgia Institute of Technology, Atlanta, GA

- Fall 2015- **IMPACT Post-doctoral Fellow**
Spring 2018 *Awarded by the School of Mathematics, Georgia Institute of Technology, Atlanta, GA*

University of South Carolina, Columbia, SC

- Fall 2014- **Dean's Doctoral Dissertation Fellow**
Spring 2015 *1 of 10 Awarded by the College of Arts and Sciences, University of South Carolina, Columbia, SC*

- Fall 2010 - **Graduate Teaching Assistant**
Spring 2014 *Instructor of record for one undergraduate course each semester*

Virginia Commonwealth University, Richmond, VA

- Summer 2010 **Adjunct Instructor**
Instructor of record for one summer course.
- Fall 2008- **Graduate Teaching Assistant**
Spring 2010 *Instructor of record for two undergraduate courses each semester.*

Research Visits

- Summer 2016 5 day research visit to the University of Colorado, Denver to collaborate with Michael Ferrara, Ryan Martin, William Kay, and Eric Sullivan
- Fall 2014 2 day research visit to University College London and Oxford University, sponsored by the AMS, to collaborate with Valentin Danchev and Beate Franke
- Fall 2014 4 week research visit to the the Alfréd Rényi Institute of Mathematics of the Hungarian Academy of Sciences, sponsored by the College of Arts and Sciences of the University of South Carolina, to collaborate with István Miklós
- Summer 2013 4 week research visit to the Alfréd Rényi Institute of Mathematics of the Hungarian Academy of Sciences, sponsored by the provost of the University of South Carolina, to collaborate with István Miklós and Péter Erdős

Honors and Awards

Fellowships

- 2016 Travel Grant for the 6th Polish Combinatorial Conference (\$190)
- 2016 Travel Grant for the 13th Triangle Lectures in Combinatorics (\$330)
- 2015 Travel Grants for the Connections in Discrete Mathematics conference (\$769 from the Graduate School of the University of South Carolina, \$200 from the conference)
- 2015 Fully funded participant: Rocky Mountain–Great Plains Graduate Research Workshop in Combinatorics (\$400 in addition to meals and lodging)
- 2015 Travel Grant for the 2015 Midwest Combinatorics Conference (\$500 in addition to lodging)
- 2015 Travel Grant for the Association for Women in Mathematics Research Symposium (\$380)
- 2015 Travel Grant for the Joint Mathematics Meetings from the AMS (\$800)
- 2014 Travel Grant for the AMS Sectional Meeting, Greensboro, NC from the AMS (\$230)
- 2014 Travel Award from the AMS for research visit to University College London and Oxford University (\$750)
- 2014-2015 Dean's Doctoral Dissertation Fellowship from the College of Arts and Sciences of the University of South Carolina. (\$25,000)
- 2014 Fully funded participant: Rocky Mountain–Great Plains Graduate Research Workshop in Combinatorics (\$950 and lodging)

- 2014 Fully funded participant: Mathematics Research Communities in Network Science (\$650 in addition to meals and lodging)
- Summer 2014 Research Assistantship from NSF DMS contract #1300547 (\$4,000)
- 2013 SPARC Graduate Fellowship from the Office of the Vice President for Research at the University of South Carolina (\$5,000)
- Summer 2012 Research Assistantship from the National Science Foundation NSF DMS contract #1000475 (\$3,200)

Awards

- Apr. 2013 "2012-2013 Outstanding Graduate Teaching Assistant" awarded by the Department of Mathematics, University of South Carolina, Columbia, SC
- Mar. 2011 "2010-2011 Outstanding First Year Graduate Student" awarded by the Department of Mathematics, University of South Carolina, Columbia, SC
- Mar. 2007 "Outstanding Junior Student 2006/2007" awarded by the Department of Mathematics, Houghton College, Houghton, NY

Presentations

Conference Organization

- 14-16 Oct. 2016 **Organized a mini-symposium on "Discrete and Algebraic Approaches in Mathematical Biology"**
Ninth Annual International Symposium on Biomathematics and Ecology Education and Research, College of Charleston, Charleston, SC
- 6-10 Jun. 2016 **Co-organized a mini-symposium on "Discrete Mathematical Biology" (with Christine Heitsch)**
SIAM Conference on Discrete Mathematics, Georgia State University, Atlanta, GA

Invited Talks

- 4 Nov. 2016 **Induced Saturation for Posets (55 min.)**
Discrete Seminar, University of South Carolina, Columbia, SC
- 6 Jun. 2016 **Extremal Properties of Vertex Attributes in Trees (25 min.)**
Special Session on Structures in Trees
SIAM Conference on Discrete Mathematics, Georgia State University, Atlanta, GA
- 16 Apr. 2016 **Extremal Properties of Vertex Attributes in Trees (25 min.)**
Special Session on Extremal Graph Theory
AMS Spring Central Sectional Meeting #1120, North Dakota State University, Fargo, ND
- 5 Mar. 2016 **Counting Single Cut-or-Join Scenarios (25 min.)**
Special Session on Theory and Applications of Graphs,
AMS Spring Southeastern Sectional Meeting #1117, University of Georgia, Athens, GA
- 11 Nov. 2015 **Zero Forcing: The Spread of Infection on a Graph (50 min.)**
Discrete Math Seminar, Kennesaw State University, Marietta, GA
- 20 Oct. 2015 **The Single Cut-or-Join Model for Gene Rearrangement (50 min.)**
Discrete Seminar, Georgia State University, Atlanta, GA
- 11 Oct. 2015 **Counting Single Cut-or-Join Scenarios (25 min.)**
Minisymposium on Algebraic and Discrete Methods in Mathematical Biology,
Eighth Annual International Symposium on Biomathematics and Ecology Education and Research,
Illinois State University, Normal, IL
- 12 Apr. 2015 **Sampling Single Cut-or-Join Scenarios (20 min.)**
Special Session on Discrete Mathematics (and Theoretical Computer Science),
AWM Research Symposium 2015, University of Maryland, College Park, MD

- 11 Jan. 2015 **Sampling Single Cut-or-Join Scenarios (20 min.)**
AMS Special Session on Network Science, 2015 Joint Mathematics Meetings,
 Henry B. Gonzalez Convention Center, San Antonio, TX
- 24 Oct. 2014 **Zero Forcing: The Spread of Infection on a Graph (20 min.)**
Carolina Math Seminar, Columbia College, Columbia, SC
- 27 Apr. 2013 **Zero Divisors among Digraphs (15 min.)**
Mini-Conference on Graduate Research, Georgia Southern University, Statesboro, GA

Seminar Talks

- 20 Nov. 2015 **Counting Single Cut-or-Join Scenarios (55 min.)**
Combinatorics Seminar, Georgia Institute of Technology, Atlanta, GA
- 3 Apr. 2015 **On the Complexity of Genome Rearrangement (60 min.)**
Discrete Seminar, University of South Carolina, Columbia, SC
- 30 Apr. 2014 **Approximating the Number of Double Cut-and-Join Scenarios (60 min.)**
SIAM Student Chapter, University of South Carolina, Columbia, SC
- 22 Mar. 2013 **The Lovász Isotopy Lemma (60 min.)**
Algebra and Logic Seminar, University of South Carolina, Columbia, SC
- 1 Mar. 2013 **Results of Lovász Concerning Direct Products (60 min.)**
Algebra and Logic Seminar, University of South Carolina, Columbia, SC
- 30 Apr. 2010 **Math and Origami (60 min.)**
Graduate Student Seminar, Virginia Commonwealth University, Richmond, VA
- 5 Feb. 2010 **Extensions of the Pythagorean Theorem (60 min.)**
Analysis seminar, Virginia Commonwealth University, Richmond, VA

Other

- 16 Oct. 2016 **Exploring the Space of RNA Secondary Structures (25 min.)**
Special Session on Discrete and Algebraic Approaches in Mathematical Biology
Ninth Annual International Symposium on Biomathematics and Ecology Education and Research,
 College of Charleston, Charleston, SC
- 20 Sept. 2016 **Saturation for Induced Subposets (20 min.)**
6th Polish Combinatorial Conference, The Polish Academy of Sciences' Conference Center, Będlewo,
 Poland
- 9 Jun. 2016 **Complexity of the Single Cut-Or-Join Model for Genome Rearrangement (25 min.)**
Special Session on Discrete Mathematical Biology
SIAM Conference on Discrete Mathematics, Georgia State University, Atlanta, GA
- 29 Sep. 2015 **Zero Forcing: The Spread of Infection on a Graph (25 min.)**
Undergraduate Seminar
 Georgia Institute of Technology, Atlanta, GA
- 16 Jun. 2015 **Computational Complexity of Weight Functions on Optimal Medians (20 min.)**
Connections in Discrete Mathematics
 Simon Fraser University, Burnaby, BC, Canada
- 26 May 2015 **Tree, Partitions, and Other Combinatorial Structures (45 min.)**
Public Dissertation Defense
 University of South Carolina, Columbia, SC
- 1 Aug. 2014 **Combinatorics of a Model for RNA Folding (15 min.)**
Rocky Mountain–Great Plains Graduate Research Workshop in Combinatorics
 Iowa State University, Ames, IA
- 28 Mar. 2015 **On the Combinatorics of Genome Rearrangement (20 min.)**
Graduate Student Combinatorics Conference, University of Kentucky, Lexington, KY
- 9 Nov. 2014 **Eccentricity in Trees (10 min.)**
AMS Fall Southeastern Section Meeting, University of North Carolina, Greensboro, NC

- 1 Aug. 2014 **Pseudo-winning teams in Digraphs (15 min.)**
Rocky Mountain–Great Plains Graduate Research Workshop in Combinatorics
University of Denver, Denver, CO
- 25 Jun. 2014 **Approximating the Number of Single Cut-or-Join Scenarios (10 min.)**
AMS Mathematics Research Community on Network Science
Snowbird Ski and Summer Resort, Snowbird, UT
- 11 Apr. 2014 **Markov Chains and the Single Cut-or-Join Model (15 min.)**
17th Annual Graduate Student Day, University of South Carolina, Columbia, SC
- 5 Apr. 2014 **Baranyai Partitions and the Anti-Baranyai Theorem (25 min.)**
10th Graduate Student Combinatorics Conference, Auburn University, Auburn, AL
- 6 Mar. 2014 **Constructing Baranyai Partitions (15 min.)**
The 45th Southeastern International Conference on Combinatorics, Graph Theory, and Computing,
Florida Atlantic University, Boca Raton, FL
- 19 Apr. 2010 **Zero Divisors among Digraphs (45 min.)**
Public Defense of Master's Thesis, Virginia Commonwealth University, Richmond, VA

Teaching Experience

Georgia Institute of Technology, Atlanta, GA

Fall 2015-
present **Visiting Assistant Professor**

School of Mathematics

- MATH 3012: Applied Combinatorics (Fall 2015, Spring 2016, Spring 2017)
 - 3 credit course required for math and computer science majors. 65-100 students. Supervised an undergraduate who was responsible for grading homeworks and holding review sessions. Course topics included basic counting, recursions, generating functions, probability, graph theory, and graph algorithms.
- MATH 1552: Integral Calculus (Fall 2016)
 - 4 credit hours. 85 students. Supervised 3 undergraduate teaching assistants who led 2 hours of recitation each week, graded quizzes, and held review sessions. Used Learning Catalytics in lecture for feedback on student learning.

University of South Carolina, Columbia, SC

Spring 2011-
Spring 2014 **Instructor of Record**

Department of Mathematics

- MATH 111: Basic College Mathematics (Spring 2011)
- MATH 115: Precalculus Mathematics (Spring 2012)
- MATH 122: Business Calculus (Spring 2013)
- MATH 141: Calculus I (Fall 2012, Fall 2013)
- MATH 241: Vector Calculus (Summer 2011, Fall 2011, Summer 2013)
- MATH 374: Discrete Structures (Spring 2014)

Fall 2010, **Graduate Teaching Assistant**

Fall 2013 *Department of Mathematics*

- MATH 142: Calculus II (Led weekly recitations and taught a computer lab with Maple)

Virginia Commonwealth University, Richmond, VA

Summer 2010 **Adjunct Instructor for Calculus I MATH 161**

Department of Mathematics and Applied Mathematics

- MATH 161: Calculus I

Fall 2008-
Spring 2010 **Instructor of Record**

Department of Mathematics and Applied Mathematics

- MATH 141: Algebra with Applications (Fall 2008, Spring 2009)
- MATH 151: Precalculus Mathematics (Fall 2009, Spring 2010)

Self-Employed

- Spring 2007-present **Private mathematics tutor**
Tutor for math major courses at the University of South Carolina
- MATH 574: Discrete Mathematics
 - MATH 546: Algebraic Structures I
 - MATH 544: Linear Algebra
 - MATH 300: Transition to Advanced Mathematics

Professional Service

- Spring 2017 **Co-organizer of the Combinatorics Seminar**
Georgia Institute of Technology, Atlanta, GA
- 17-18 Oct. 2016 **Organizer for IMPACT Distinguished Lecture Series presentation by Tandy Warnow**
Georgia Institute of Technology, Atlanta, GA
- Fall 2016-present **Research advisor for undergraduate Cathy Chen (B.S. in Computer Science)**
Georgia Institute of Technology, Atlanta, GA
- 2016-present **Referee for Discrete Mathematics**
- 25 May-20 Jul. 2016 **Co-leader of IMPACT REU program**
Georgia Institute of Technology, Atlanta, GA
Research advisees Ida De Vierno and Isabella Nang presented a poster at the 2017 Joint Mathematics Meetings, Atlanta, GA and Isabella Nang gave talks in undergraduate seminars at both Georgia Tech and Georgia State
- 12 Mar. 2016 **Grader for the 2016 Georgia Tech High School Mathematics Competition**
Georgia Institute of Technology, Atlanta, GA
- 2015-present **Reviewer for Mathematical Reviews**
American Mathematical Society
- 2015-present **Referee for Theory and Applications of Graphs**
- 31 Jan. 2015 **Proctor for the 29th High School Mathematics Competition and Menger Sponge Build**
University of South Carolina, Columbia, SC
- 2013-2015 **Judge for the 11th, 12th, and 13th Annual Integration Bees**
Pi Mu Epsilon Alpha Chapter and Gamecock Math Club
University of South Carolina, Columbia, SC
- 2011, 2014, 2015 **Proctor for the AP Examination**
University of South Carolina, Columbia, SC
- 2 Oct. 2014 **Presentation about the Beauty of Mathematics Research (45 min.)**
High school senior class.
International Christian School of Budapest, Diósd, Hungary
- 2013-2014 **Proctor for the 27th and 28th High School Mathematics Competition**
University of South Carolina, Columbia, SC
- 2012-2013 **Co-referee with László Székely for the following journals:**
- *Moscow Journal of Combinatorics and Number Theory*
 - *Electronic Journal of Combinatorics*
 - *Central European Journal of Mathematics*
- 2012 **Mentor with the Women's Mentoring Program**
University of South Carolina, Columbia, SC

Summer Schools/Workshops Attended

Fully-funded Participant

- 1 Jun. - **Rocky Mountain–Great Plains Graduate Research Workshop in Combinatorics**
12 Jun. 2015 Iowa State University, Ames, IA
- 27 Jul.- **Rocky Mountain–Great Plains Graduate Research Workshop in Combinatorics**
8 Aug. 2014 University of Denver and University of Colorado Denver, Denver, CO
- 25-29 Jun. 2014 **AMS Mathematics Research Community on Network Science**
Snowbird Ski and Summer Resort, Snowbird, UT

Other

- 14-17 Sep. 2016 **Order and Geometry Workshop**
Gułtowy Palace, Gułtowy, Poland
- 20-31 May 2013 **Summer School in Network Science**
University of South Carolina, Columbia, SC

Conferences Attended

- 31 Jul. - **SIAM Conference on Applied Algebraic Geometry**
4 Aug. 2017 Georgia Institute of Technology, Atlanta, GA
- 9-11 Jan. 2017 **A Conference Celebrating the 25th Anniversary of the ACO Program**
Georgia Institute of Technology, Atlanta, GA
- 4-7 Jan. 2017 **2017 Joint Mathematics Meetings**
Hyatt Regency Atlanta and Marriott Atlanta Marquis, Atlanta, GA
- 22-23 Oct. 2016 **Atlanta Lecture Series in Combinatorics and Graph Theory XVIII**
Emory University, Atlanta, GA
- 14-16 Oct. 2016 **Ninth Annual International Symposium on Biomathematics and Ecology Education and Research**
College of Charleston, Charleston, SC
- 19-23 Sep. 2016 **6th Polish Combinatorial Conference**
Polish Academy of Sciences' Conference Center, Będlewo, Poland
- 6-10 Jun. 2016 **SIAM Conference on Discrete Mathematics**
Georgia State University, Atlanta, GA
- 16-17 Apr. 2016 **AMS Spring Central Sectional Meeting #1120**
North Dakota State University, Fargo, ND
- 5-6 Mar. 2016 **AMS Spring Southeastern Sectional Meeting #1117**
University of Georgia, Athens, GA
- 27 Feb. 2016 **13th Triangle Lectures in Combinatorics**
University of North Carolina, Greensboro, NC
- 14-15 Nov. 2015 **Atlanta Lecture Series in Combinatorics and Graph Theory XVI**
Georgia Institute of Technology, Atlanta, GA
- 9-11 Oct. 2015 **Eighth Annual International Symposium on Biomathematics and Ecology Education and Research**
Illinois State University, Normal, IL
- 15-19 Jun. 2015 **Connections in Discrete Mathematics**
Simon Fraser University, Burnaby, BC, Canada
- 19-21 May 2015 **2015 Midwest Combinatorics Conference**
University of Minnesota, Minneapolis, MN

- 15-17 May 2015 **28th Cumberland Conference on Combinatorics, Graph Theory, & Computing**
University of South Carolina, Columbia, SC
- 11-12 Apr. 2015 **Association for Women in Mathematics Research Symposium 2015**
University of Maryland, College Park, MD
- 27-29 Mar. 2015 **Graduate Student Combinatorics Conference**
University of Kentucky, Lexington, KY
- 7-8 Mar. 2015 **2nd Lake Michigan Workshop on Combinatorics and Graph Theory**
University of Notre Dame, Notre Dame, IN
- 10-13 Jan. 2015 **2015 Joint Mathematics Meetings**
Henry B. Gonzalez Convention Center, San Antonio, TX
- 8-9 Nov. 2014 **AMS Fall Southeastern Section Meeting #1105**
University of North Carolina, Greensboro, NC
- 24 Oct. 2014 **Carolina Math Seminar**
Columbia College, Columbia, SC
- 26 Apr. 2014 **Atlanta Lecture Series in Combinatorics and Graph Theory XII**
Georgia Institute of Technology, Atlanta, GA
- 4-5 Apr. 2014 **Graduate Student Combinatorics Conference**
Auburn University, Auburn, AL
- 3-7 Mar. 2014 **45th Southeastern Int. Conference on Combinatorics, Graph Theory and Computing**
Florida Atlantic University, Boca Raton, FL
- 22 Feb. 2014 **9th Triangle Lectures in Combinatorics**
University of North Carolina, Chapel Hill, NC
- 20-21 Sep. 2013 **8th Triangle Lectures in Combinatorics**
North Carolina State University, Raleigh, NC
- 1-5 Jul. 2013 **Erdős Centennial Conference**
The Alfréd Rényi Institute of Mathematics, Budapest, Hungary
- 24-28 Jun. 2013 **Random Walks: Crossroads and Perspectives**
The Alfréd Rényi Institute of Mathematics, Budapest, Hungary
- 27 Apr. 2013 **Mini-Conference on Graduate Research**
Georgia Southern University, Statesboro, GA
- 4-8 Mar. 2013 **44th Southeastern Int. Conference on Combinatorics, Graph Theory and Computing**
Florida Atlantic University, Boca Raton, FL
- 27-28 Oct. 2011 **26th Clemson Mini-Conference on Discrete Mathematics and Algorithms**
Clemson University, Clemson, SC
- 24-25 Sep. 2011 **AMS Fall Southeastern Section Meeting #1073**
Wake Forest University, Winston-Salem, NC
- 7-8 Oct. 2010 **25th Clemson Mini-Conference on Discrete Mathematics and Algorithms**
Clemson University, Clemson, SC
- 5-8 Jan. 2009 **2009 Joint Mathematics Meetings**
Marriott Wardman Park and Omni Shoreham, Washington, DC

Pedagogy Workshops Attended

- 18 Nov. 2016 **Measuring Learning**
Center for the Enhancement of Teaching and Learning Faculty Development Workshop, Georgia Institute of Technology, Atlanta, GA
- 19 Oct. 2016 **Teaching Students Across Multiple Backgrounds and Abilities**
Center for the Enhancement of Teaching and Learning Faculty Development Workshop, Georgia Institute of Technology, Atlanta, GA
- 18,28 Mar. 2016 **LearnTech Scholars**
Center for Teaching and Learning (CTL) Faculty Learning Community, Georgia Institute of Technology, Atlanta, GA

Memberships

- American Mathematical Society (AMS)
- Society for Industrial and Applied Mathematics (SIAM)
- Gamecock Math Club at the University of South Carolina, Columbia, SC
- Pi Mu Epsilon (IIME)
- Association for Women in Mathematics (AWM)

References

László Székely

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