Christopher Cox

Curriculum Vitæ

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Research Interests

Extremal combinatorics, probablilistic methods, algebraic methods, graph theory, partially-ordered sets.

Education

Current **Doctor of Philosophy**, *Carnegie Mellon University*, Pittsburgh, PA.
Algorithms, Combinatorics and Optimization (ACO).
$\mathbb{E}[\text{GRAD}] = 2020 + \varepsilon$
Major Professor: Boris Bukh.

2015 **Master of Science**, *Iowa State University*, Ames, IA.
Mathematics.
Thesis: *Ordered and partially-ordered variants of Ramsey's theorem.*
Major Professor: Derrick Stolee.

2014 **Bachelor of Science**, *Iowa State University*, Ames, IA.
Mathematics.
Thesis: *Isospectral drums and cospectral graphs.*
Thesis Advisor: Steve Butler.

Academic Positions

2015–Cur **Teaching Assistant**, *Carnegie Mellon University*, Pittsburgh, PA.
Instructor — Concepts of Mathematics (21-127)
TA — Mathematical Studies Algebra I (21-237), Matrix Theory (21-242), Multidimensional Calculus (21-268), Calculus I (21-115), Discrete Mathematics (21-228), Concepts of Mathematics (21-127)

June–July 2015 **REU Graduate Research Mentor**, *Iowa State University*, Ames, IA.
Worked with four undergraduate students on problems about mathematical juggling. The papers "A generalization of Eulerian numbers via rook placements" and "Counting prime juggling patterns" are a result of this research workshop.

2014–2015 **Teaching Assistant**, *Iowa State University*, Ames, IA.
TA — Elementary Differential Equations (MATH 267), Calculus I (MATH 165)

Publications

To Appear

C. Cox and D. Stolee, "Ramsey numbers for partially-ordered sets," *Order*, 2018.

Published

E. Banaian, S. Butler, C. Cox, J. Davis, J. Landgraf, and S. Ponce, "A generalization of Eulerian numbers via rook placements," *Involve*, vol. 10, no. 4, pp. 691–705, Mar. 2017.

Z. Berikkyzy, C. Cox, M. Dairyko, K. Hogenson, M. Kumbhat, B. Lidický, K. Messerschmidt, K. Moss, K. Nowak, K. Palmowski, and D. Stolee, "$(4, 2)$-choosability of planar graphs with forbidden substructures," *Graphs and Combinatorics*, vol. 33, no. 4, pp. 751–787, Jul. 2017.

E. Banaian, S. Butler, C. Cox, J. Davis, J. Landgraf, and S. Ponce, "Counting prime juggling patterns," *Graphs and Combinatorics*, vol. 32, no. 5, pp. 1675–1688, Sep. 2016.

C. Cox and D. Stolee, "Ordered Ramsey numbers of loose paths and matchings," *Discrete Mathematics*, vol. 339, no. 2, pp. 499–505, Feb. 2016.

C. Cox, J. De Silva, P. DeOrsey, F. Kenter, T. Retter, and R. J. Tobin, "How to make the perfect fireworks display: Two strategies for Hanabi," *Mathematics Magazine*, vol. 88, no. 5, pp. 323–336, Dec. 2015.

Submitted

B. Bukh and C. Cox, "Nearly orthogonal vectors and small antipodal spherical codes," Mar. 8, 2018. arXiv: `1803.02949v1 [math.CO]`.

B. Bukh and C. Cox, "On a fractional version of Haemers' bound," Feb. 1, 2018. arXiv: `1802.00476v1 [cs.IT]`.

J. Briggs and C. Cox, "Inverting the Turán problem," Nov. 6, 2017. arXiv: `1711.02082v2 [math.CO]`.

Presentations

Invited

Small antipodal spherical codes. *CMU CS Theory Seminar.* Pittsburgh, PA, Oct. 2018.

A fractional version of Haemers' bound. *AMS Special Session on Graph Theory.* Newark, DE, Sep. 2018.

Inverting the Turán problem. *Iowa State University Discrete Mathematics Seminar.* Ames, IA, Jul. 2018.

Nearly orthogonal vectors. *Technion Combinatorics Seminar.* Haifa, Israel, Jun. 2018.

Nearly orthogonal vectors. *Hebrew University of Jerusalem Combinatorics Seminar.* Jerusalem, Israel, Jun. 2018.

A fractional version of Haemers' bound. *Ben-Gurion University Combinatorics Seminar.* Be'er Sheva, Israel, Jun. 2018.

Nearly orthogonal vectors. *Iowa State University Discrete Mathematics Seminar.* Ames, IA, Mar. 2018.

Ramsey numbers on the Boolean lattice. *AMS Special Session on Structural and Computational Graph Theory.* Raleigh, NC, Nov. 2016.

Ramsey numbers for partially-ordered sets. *Carnegie Mellon University Algorithms, Combinatorics and Optimization Seminar.* Pittsburgh, PA, Feb. 2016.

Ramsey numbers of ordered hypergraphs. *AMS Special Session on Extremal and Stuctural Graph Theory.* Las Vegas, NV, Apr. 2015.

Ramsey numbers of ordered hypergraphs. *University of Colorado Denver Discrete Mathematics Seminar.* Denver, CO, Mar. 2015.

Ordered Ramsey numbers of loose paths and k-uniform matchings. *Iowa State University Discrete Mathematics Seminar.* Ames, IA, Oct. 2014.

Contributed

Inverting the Turán problem. *ICGT.* Lyon, France, Jul. 2018.

Nearly orthogonal vectors (poster). *Building Bridges II.* Budapest, Hungary, Jul. 2018.

Inverting the Turán problem. *MIGHTY LIX.* Morgantown, WV, Apr. 2018.

A degree sequence variant of Ramsey's theorem. *Connections in Discrete Mathematics.* Vancouver, Canada, Jun. 2015.

Coupled choosability with separation. *Rocky Mountain–Great Plains Graduate Research Workshop in Combinatorics.* Ames, IA, Jun. 2015.

Potential Ramsey numbers. *Rocky Mountain–Great Plains Graduate Research Workshop in Combinatorics.* Denver, CO, Jul. 2014.

Normally regular digraphs resulting from Cayley graphs (poster). *SACNAS National Conference.* San Antonio, TX, Oct. 2013.

Isospectral drums and cospectral graphs. *MAA Mathfest.* Hartford, CT, Aug. 2013.

Awards/Grants

2018 **Buncher Graduate and Faculty Fellows Research Collaboration Fund**, *(with Boris Bukh).*

Provides support for a faculty member and a graduate student to spend time in Israel at the Technion Institute with the intent of building long term research collaborations between the two universities. The funding provides travel support for the faculty member to spend one week in Haifa and for the graduate student to stay on for 1–2 months working in the relevant Technion laboratory.