

March 18, 2020

CV for Donniell Fishkind

Donniell E. Fishkind
Associate Research Professor
Department of Applied Mathematics and Statistics
The Johns Hopkins University
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Experience

The Johns Hopkins University, Department of Applied Mathematics and Statistics

Affiliated Faculty, JHU Institute for Computational Medicine	Dec 2015—present
Associate Staff Scientist, JHU Human Language Technology COE	Jan. 2011—present
Director of Undergraduate Studies, AMS dept.	Jan. 2010—present
Associate Research Professor,	July 2005—present
Senior Lecturer,	July 2003—June 2005
Lecturer,	July 2001—June 2003
Visiting Assistant Professor,	July 2000—June 2001

University of Southern Maine, Department of Mathematics and Statistics

Assistant Professor, tenure track, Sept 1998—Aug 2002,
(On leave visiting The Johns Hopkins University after September 2000.)

Education

Ph.D., The Johns Hopkins University, Department of Applied Mathematics and Statistics, Baltimore, Maryland, June 1998.

Master of Science in Engineering, The Johns Hopkins University, Department of Applied Mathematics and Statistics, Baltimore, Maryland, May 1995.

Department Service

The Johns Hopkins University, Department of Applied Mathematics and Statistics

Academic Advisor of JHU Scheduling Group	Jan 2012—June 2018
Director of Undergraduate Studies	Jan. 2010—present
Advisor for HUSAM (Applied Math Club)	Aug 2010—present
Associate Director of GAANN Program	July 2009—August 2017

Publications

Linear Algebra, Discrete Mathematics, Linear Algebraic Discrete Mathematics

- 1) J.A. Fill and D.E. Fishkind, The Moore—Penrose Generalized Inverse for Sums of Matrices, *SIAM J. Matrix Anal. Appl.* **21** (1999), p. 629-635.
- 2) J.A. Fill, D.E. Fishkind, and E.R. Scheinerman, Affine Isomorphism for Partially Ordered Sets, *Order* **15** (1999), p. 183-193.
- 3) D.E. Fishkind, On Poset Similarity, *Discrete Math.* **220** (2000), p. 75-88.
- 4) L. Abrams, D.E. Fishkind, and S. Valdes-Leon, Reflecting the Pascal Matrix About its Main Antidiagonal, *Linear and Multilinear Algebra* **47** (2000), p. 129-136.
- 5) D.E. Fishkind and A. Kotlov, Rank, Term Rank, and Chromatic Number, *Discrete Math.* **250** (2002), p. 253-257.
- 6) D.E. Fishkind, On the Growth Rate of Generalized Fibonacci Numbers, *Advances in Difference Equations* **2004:4** (2004), p. 273-277.

Topology and Medical Imaging

- 7) L. Abrams, D.E. Fishkind, and C.E. Priebe, A Proof of the Spherical Homeomorphism Conjecture for Surfaces, *IEEE Transactions on Medical Imaging* **21** (2002), p. 1564-1566.
- 8) L. Abrams, D.E. Fishkind, and C.E. Priebe, The Generalized Spherical Homeomorphism Theorem for Digital Images, *IEEE Transactions on Medical Imaging* **23** (2004), p. 655-657.
- 9) L. Abrams, D.E. Fishkind, A Genus Bound for Digital Image Boundaries, *SIAM J. Disc. Math.* **19** (2005), p. 807-813.
- 10) L. Abrams and D.E. Fishkind, The Genus of a Digital Image Boundary is Determined by its Foreground, Background, and Reeb Graphs, *Discrete and Comp. Geometry* **37** (2007) 629-640.

Our work in Topology and Medical imaging is featured in:

D. Mackenzie, Topologists Take Scalpel to Brian Scans, *SIAM NEWS* **37** (September 2004)
<http://archive.siam.org/pdf/news/246.pdf>

Probabilistic Path Planning

- 11) C.E. Priebe, D.E. Fishkind, L. Abrams, C. Piatko, Random Disambiguation Paths for Traversing a Mapped Hazard Field, *Naval Research Logistics* **52** (2005), p. 285-292.
- 12) D.E. Fishkind, C.E. Priebe, K. Giles, L.N. Smith, V. Aksakalli, Disambiguation Protocols Based on Risk Simulation, *IEEE Trans Systems, Man, and Cybernetics, Part A*, **37** (2007) p. 814-823.
- 13) J. Blatz, D.E. Fishkind, C.E. Priebe, "Efficient, Optimal Stochastic-Action Selection When Limited by an Action Budget," *Math Meth Oper Res* (**72**), (2010) p. 63-74.
- 14) X. Ye, D.E. Fishkind, L. Abrams, C.E. Priebe, "Sensor Information Monotonicity in Disambiguation Protocols," *J. of the Operational Research Society* (**62**), (2011) p. 142-151.
- 15) V. Aksakalli, D.E. Fishkind, C.E. Priebe, X. Ye, "The Reset Disambiguation Policy for Navigating Stochastic Obstacle Fields," *Naval Research Logistics* **58** (2011) p. 389-399.

Publications (continued)

Social Networks; Graph Matching and Vertex Nomination

- 16) D.L. Sussman, M. Tang, D.E. Fishkind, C.E. Priebe, “A Consistent Adjacency Spectral Embedding for Stochastic Blockmodel Graphs.” *Journal of the American Statistical Association* **107:499** (2012), p. 1119—1128.
- 17) D.E. Fishkind, D.L. Sussman, M. Tang, J.T. Vogelstein, C.E. Priebe, “Consistent Adjacency-Spectral Partitioning for the Stochastic Block Model when the Model Parameters are Unknown,” *SIAM J. Matrix Anal. Appl.* **34:1** (2013) p. 23—39.
- 18) V. Lyzinski, D.E. Fishkind, and C.E. Priebe, “Seeded Graph Matching for Correlated Erdos-Renyi Graphs,” *Journal of Machine Learning Research* **15** (2014), pp 3513—3540.
- 19) D.E. Fishkind, V. Lyzinski, H. Pao, L. Chen, C.E. Priebe, “Vertex Nomination Schemes for Membership Prediction,” *Annals of Applied Statistics* **9** (2015) pp 1510—1532.
- 20) V. Lyzinski, D.L. Sussman, D.E. Fishkind, H. Pao, L. Chen, J.T. Vogelstein, Y. Park, C.E. Priebe, “Spectral Clustering for Divide-and-Conquer Graph Matching,” *Parallel Computing* **47** (2015) pp 70—87.
- 21) J.T. Vogelstein, J.M. Conroy, L.J. Podrazik, S.G. Kratzer, E.T. Harley, D.E. Fishkind, R.J. Vogelstein, C.E. Priebe, “Fast Approximate Quadratic Programming for Graph Matching,” *PLOS ONE*, DOI:10.1371/journal.pone.0121002 April 17, 2015.
- 22) D.E. Fishkind, C. Shen, Y. Park, C.E. Priebe, “On the Incommensurability Phenomenon,” *Journal of Classification* **33** (2016), pp 185—209.
- 23) V. Lyzinski, D.E. Fishkind, M. Fiori, J.T. Vogelstein, C.E. Priebe, G. Sapiro, “Graph Matching: Relax at Your Own Risk,” *IEEE Transactions on Pattern Analysis and Machine Intelligence* **38** (2016), pp 60—73.
- 24) V. Lyzinski, K. Levin, D.E. Fishkind, C.E. Priebe, “On the Consistency of the Likelihood Maximization Vertex Nomination Scheme,” *Journal of Machine Learning Research* **17** (2016), pp 1—34.
- 25) A. Athreya, D.E. Fishkind, K. Levin, V. Lyzinski, Y. Park, Y. Qin, D.L. Sussman, M. Tang, J.T. Vogelstein, C.E. Priebe, “Statistical Inference on Random Dot Product Graphs: A Survey”, *Journal of Machine Learning Research* **18** (2018) pp 1—92.
- 26) D.E. Fishkind, S. Adali, H.G. Patsolic, L. Meng, D. Singh, V. Lyzinski, C.E. Priebe, “Seeded Graph Matching,” *Pattern Recognition* **87** (2019), pp 203—215.
- 27) D.E. Fishkind, L. Meng, A. Sun, C.E. Priebe, V. Lyzinski, “Alignment Strength and Correlation for Graphs,” *Pattern Recognition Letters* **125** (2019), pp 295—302.
- 28) J. Yoder, L.Chen, H. Pao, E. Bridgeford, K. Levin, D.E. Fishkind, C.E. Priebe, V. Lyzinski, “Vertex Nomination: The Canonical Sampling and the Extended Spectral Nomination Schemes,” *Computational Statistics and Data Analysis* **145** (2020) 106916.
- 29) D.E. Fishkind, A. Athreya, L. Meng, V. Lyzinski, C.E. Priebe, On a complete and sufficient statistic for the correlated Bernoulli random graph model, submitted.

PHD Students at JHU

- 1) Vural Aksakalli, defended his doctoral dissertation on March 19, 2007.
- 2) Henry Pao, defended his doctoral dissertation on January 21, 2015.
- 3) Lingyao Meng, expected to defend doctoral dissertation in Summer 2020.

Selected Grants

- 1) Office of Naval Research, grant N000140610013, October 2005—September 2008 (\$300,000). “Random Disambiguation Paths for Adaptive Navigation through Mine and Obstacle Fields: Basic Research.” I was co-Principal Investigator with Carey Priebe.
- 2) U.S. Department of Education GAANN grant P200A090128, August 2009—August 2012 (\$522,624). I was co-Principal investigator with Dan Naiman. I was Associate Project Director.
- 3) Gateway Science Initiative Grant, JHU Provost (\$73,816) in 2011. “Statistics through case study.” I was co-PI with Dan Naiman, Avanti Athreya, Bruno Jedynak, Fred Torcaso.
- 4) U.S. Department of Education GAANN grant P200A120036, August 2012—August 2015 (\$666,330). I was co-Principal investigator with Dan Naiman. I was Associate Project Director.
- 5) JHU Scheduling Group. From 2012 through 2018 I was the technical/ academic director. We produced season schedules for many of the leagues in Minor League Baseball. The leagues made donations (unrestricted gifts) to the Johns Hopkins University to support our research.

Professional Service

Refereed manuscripts for the following journals:

- 1) *SIAM Journal on Discrete Mathematics*,
- 2) *Order*,
- 3) *Computational Optimization and Applications*,
- 4) *Journal of Graph Theory*,
- 5) *Journal of Statistical Planning and Inference*,
- 6) *The American Mathematical Monthly*,
- 7) *Discrete Mathematics*,
- 8) *Discrete Applied Mathematics*,
- 9) *Applied Mathematics Letters*,
- 10) *Journal of Computational and Graphical Statistics*,
- 11) *Mathematics Magazine*.
- 12) Grant proposal referee for the National Science Foundation.

Teaching/ Mentoring Awards

- 1) Robert B. Pond, Sr. Excellence in Teaching Award, 2006. (Johns Hopkins University, Whiting School of Engineering.)
- 2) Staff Excellence Award for Leadership and Service, 2009. The Johns Hopkins University SGA awards “a deserving member of the Homewood staff, faculty, or administration who has demonstrated a commitment to helping students in a meaningful way.”
- 3) AMS Department Teaching Award, May 2009. (Selected by students of the Applied Math Club at Johns Hopkins University.)
- 4) Alumni Association Excellence in Teaching Award for 2010. (Johns Hopkins University.)
- 5) Joel Dean Award for Excellence in Teaching for 2011. (Johns Hopkins University, Department of Applied Mathematics and Statistics.)
- 6) AMS Department Teaching Award, May 2011. (Selected by students of the Applied Math Club at Johns Hopkins University.)
- 7) Joel Dean Award for Excellence in Teaching for 2012. (Johns Hopkins University, Department of Applied Mathematics and Statistics.)
- 8) William H. Huggins Excellence in Teaching Award for 2013. (Johns Hopkins University, Whiting School of Engineering.)
- 9) AMS Department Teaching Award, May 2014. (Selected by students of the Applied Math Club at Johns Hopkins University.)
- 10) Johns Hopkins Career Champion Award, 2018. (Top three, university wide.) Articles: <https://hub.jhu.edu/2018/05/09/career-center-champion-awards/>
<https://studentaffairs.jhu.edu/careers/news/career-champions-2018/>
- 11) Joel Dean Award for Excellence in Teaching for 2019. (Johns Hopkins University, Department of Applied Mathematics and Statistics.)
- 12) Joel Dean Award for Excellence in Teaching for 2020. (Johns Hopkins University, Department of Applied Mathematics and Statistics.)

Recent Highlighted Talks

- ❖ “Applying Combinatorial Optimization: Design Projects for High School Students,” Project Ingenuity presentation to faculty of Poly Tech High School, July 5, 2018.
- ❖ SOHOP Faculty Spotlight Presentation, Wednesday April 6, 2016

Teaching, general

- ❖ Taught 5,998 students in 117 courses at John Hopkins University and University of Southern Maine.
- ❖ Served on 28 PhD dissertation committees at JHU, was second reader for 4 of these dissertations (and was the first reader/ advisor for 2 of these dissertations).
- ❖ Served on 128 Graduate Board Oral and AMS Departmental Examination committees at JHU.
- ❖ Supervised 85 *undergraduate* student/semesters of independent research, from year 2012 to date. (Mostly JHU Scheduling Group.)
- ❖ Faculty advisor for four competition teams in mathematics contests.

Specific University Courses Which I Taught
from 1998 through Fall 2019 at Johns Hopkins Univ. and University of Southern Maine

University	Course number	Course name	Level	# times taught	Total # of students
Johns Hopkins	553.111	Statistical Analysis I (non calculus based)	Freshman	12	1490
Johns Hopkins	553.112	Statistical Analysis II (non calculus based)	Freshman	2	155
Johns Hopkins	553.171	Discrete Mathematics	sophomore	4	323
Johns Hopkins	553.291	Linear Algebra and Differential Equations	sophomore	3	172
Johns Hopkins	553.310 553.311	Probability and Statistics (calculus based)	Junior	11	756
Johns Hopkins	553.371 650.471	Cryptology and Coding Theory	Junior	13	357
Johns Hopkins	553.385	Numerical Linear Algebra	Junior	4	25
Johns Hopkins	553.361 553.362	Optimization I Optimization II	Junior	10 9	1249 320
Johns Hopkins	553.463	Network Flows	Senior	5	44
Johns Hopkins	553.671 553.471	Combinatorial Analysis	graduate/ senior	6	79
Johns Hopkins	553.672 553.472	Graph Theory	graduate/ senior	7	163
Johns Hopkins	553.792	Matrix Analysis and Linear Algebra	Graduate	15	500
Johns Hopkins	550.890	Linear Algebraic Graph Theory (topics)	Graduate	1	4
JHU Applied Physics Lab.	625.436	Graph Theory	Graduate	3	14
Univ. of Southern ME	MAT572 COS374 MAT364	Numerical Analysis	graduate/ senior	1	13
Univ. of Southern ME	MAT570 MAT498	Matrix Analysis	graduate/ senior	1	11
Univ. of Southern ME	MAT571 MAT492	Graph Theory	graduate/ senior	1	13
Univ. of Southern ME	MAT460	Mathematical Modeling	Senior	1	8
Univ. of Southern ME	MAT120	Probability and Statistics (non calculus based)	Freshman	8	302

TOTALS

(as of January 16, 2020)

117

5998

Johns Hopkins Scheduling Group, and Minor League Baseball

Was academic advisor for the JHU Scheduling Group from January 2012—June 2018.
(Tony Dahbura is executive director.)

We have been doing game scheduling for leagues in Minor League Baseball.

Our work has been featured in:

<http://www.baltimoresun.com/health/bs-hs-baseball-scheduling-20140417,0,946335.story>

<http://hub.jhu.edu/2014/04/02/baseball-schedules-computer-program> (with video)

http://m.milb.com/news/article/20160122162513496/hopkins_students_help_create_optimal_schedules

<https://www.yahoo.com/tech/student-devised-system-may-finally-solve-a-knotty-82219005722.html>

<http://releases.jhu.edu/2015/06/16/johns-hopkins-math-students-a-hit-with-minor-league-baseball-schedulers/>

<http://www.wbaltv.com/education/jhu-students-come-up-with-better-way-to-schedule-sports-teams/33987014>

Schedules that we made and were adopted, while I was academic director:

- New York-Penn League 2015, 2016, 2017, 2018 Schedule
 - South Atlantic League 2016, 2017, 2018, 2019 Schedule
 - Southern League 2016, 2017, 2018, 2019 Schedule
 - International League 2017, 2018, 2019 Schedule
 - Florida State League 2017, 2018 Schedule
 - Appalachian League 2017 Schedule
 - Texas League 2019 Schedule
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- Fall 2015 Final Exam Schedule for Johns Hopkins University, Homewood Campus
 - Spring 2016 Final Exam Schedule for Johns Hopkins University, Homewood Campus
 - Subsequent semester Final Exam Schedules are made with our software