Donniell E. Fishkind

Associate Research Professor
Department of Applied Mathematics and Statistics
The Johns Hopkins University
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Professional Goal

To conduct high quality mathematical research and instruction in both pure and applied mathematical disciplines.

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
Associate Director of Undergraduate Studies, AMS dep.	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. Prof. Edward R. Scheinerman, advisor.
Master of Science in Engineering, The Johns Hopkins University, Department of Applied Mathematics and Statistics, Baltimore, Maryland, May 1995.
Master of Science, University of Maryland, Baltimore County, Department of Mathematics, Catonsville, Maryland, May 1993.
Bachelor of Science, University of Maryland, Baltimore County, Department of Mathematics, Catonsville, Maryland, December 1991

Research and Teaching Interests

Research interests include graph theory, combinatorial analysis, and linear algebra and matrix analysis. One current project involves topological aspects of medical imaging, another current project involves probabilistic path planning, and another current project involves random graph models for social networks. My teaching interests span all of the mathematical sciences.

Publications

Linear Algebra, Discrete Mathematics, Linear Algebraic Discrete Mathematics

- 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.
- J.A. Fill, D.E. Fishkind, and E.R. Scheinerman, Affine Isomorphism for Partially Ordered Sets, *Order* **15** (1999), p. 183-193.
- D.E. Fishkind, On Poset Similarity, *Discrete Math*. **220** (2000), p. 75-88.
- 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.
- D.E. Fishkind and A. Kotlov, Rank, Term Rank, and Chromatic Number, *Discrete Math*. **250** (2002), p. 253-257.
- 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

- 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.
- 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.
- L. Abrams, D.E. Fishkind, A Genus Bound for Digital Image Boundaries, *SIAM J. Disc. Math*. **19** (2005), p. 807-813.
- 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://www.siam.org/pdf/news/246.pdf

Probabilistic Path Planning

- 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.
- 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.
- 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.
- 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.
- 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.

Social Networks; Graph Matching and Vertex Nomination

- 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.
- 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.
- 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.
- D.E. Fishkind, C. Shen, Y. Park, C.E. Priebe, "On the Incommensurability Phenomenon," accepted for publication in *Journal of Classification*.
- 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.
- 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.
- 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.
- J.T. Vogelstein, J.M. Conroy, L.J. Podrazik, S.G. Kratzer, E.T. Harley, D.E. Fishkind, R.J. Vogelstein, C.E. Priebe, "Brain Graph Matching Via Fast Approximate Quadratic Programming, *PLOS ONE*, DOI:10.1371/journal.pone.0121002 April 17, 2015.

Johns Hopkins Scheduling Group, and Minor League Baseball

Am academic advisor for the JHU Scheduling Group. 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 are in use:

- New York-Penn League 2015 Schedule
- New-York-Penn League 2016 Schedule
- South Atlantic League 2016 Schedule
- Southern League 2016 Schedule
- International League 2017 Schedule
- New York-Penn League 2015 Umpire Schedule
- South Atlantic League 2016 Umpire Schedule
- Fall 2015 Final Exam Schedule for Johns Hopkins University, Homewood Campus
- Spring 2016 Final Exam Schedule for Johns Hopkins University, Homewood Campus

Department Service

The Johns Hopkins University, Department of Applied Mathematics and Statistics

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

Professional Service

Refereed manuscripts for the following journals: *SIAM Journal on Discrete Mathematics, Order, Computational Optimization and Applications, Journal of Graph Theory, Journal of Statistical Planning and Inference, The American Mathematical Monthly, Discrete Mathematics, Discrete Applied Mathematics, Applied Mathematics Letters, Journal of Computational and Graphical Statistics*. Refereed grant proposal for the National Science Foundation. Wrote a book review.

Grants and Awards

- U.S. Department of Education GAANN grant P200A40303, September 1994—June 1997. I was a GAANN Fellow; the Principal Investigators were Daniel Naiman and Colin Wu.
- Office of Naval Research, grant N000140410483, April 2004—April 2005 ($100,000). "Random Disambiguation for Adaptive Mine Counter Measures Path Planning." Principal Investigator was Carey Priebe.
- 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.
- Acheson J. Duncan Fund for the Advancement of Research in Statistics, grant number 06-11, June 2006 ($5,035). I was granted support for travel to ICAPS 2006 for research presentation.
- Awarded the (Johns Hopkins University Whiting School of Engineering) Robert B. Pond, Sr. Excellence in Teaching Award, 2006. (I was given $1000 in cash and a $1000 allocation for research activities.)
- Acheson J. Duncan Fund for the Advancement of Research in Statistics, grant number 07-7, March 2007 ($16,080). I was granted support for sabbatical visit of Prof. Lowell Abrams.
- Acheson J. Duncan Fund for the Advancement of Research in Statistics, grant number 08-17,

January 2008 ($13,400). I was granted support for sabbatical visit of Prof. Lowell Abrams.
- Staff Excellence Award for Leadership and Service (SEALS), May 2009. The Johns Hopkins University SGA gives the award to "a deserving member of the Homewood staff, faculty, or administration who has demonstrated a commitment to helping students in a meaningful way."
- Departmental Teaching Award, May 2009. Selected by students of the Applied Math Club at Johns Hopkins University.
- U.S. Department of Education GAANN grant P200A090128, August 2009—August 2012 ($522,624). I was co-Principal investigator with Dan Naiman. I Am Associate Project Director.
- Awarded the Johns Hopkins University Alumni Association Excellence in Teaching Award for 2010. (Awarded $1,100.)
- Awarded the Joel Dean Award for Excellence in Teaching for 2011. (Awarded $1,000.)
- Departmental Teaching Award, May 2011. Selected by students of the Applied Math Club at Johns Hopkins University.
- Gateway Science Initiative Grant, JHU Provost ($73,816) in 2011. "Statistics through case study." I am co-PI with Dan Naiman, Avanti Athreya, Bruno Jedynak, Fred Torcaso.
- Awarded the Joel Dean Award for Excellence in Teaching for 2012. (Awarded $1500.)
- U.S. Department of Education GAANN grant P200A120036, August 2012—August 2015 ($666,330). I was co-Principal investigator with Dan Naiman. I Am Associate Project Director.
- Awarded the William H. Huggins Excellence in Teaching Award for 2013. (Awarded $1000 in cash and $1000 for research activities.)
- Departmental Teaching Award, May 2014. Selected by students of the Applied Math Club at Johns Hopkins University.

Students

Two PhD students at JHU: Vural Aksakalli defended his doctoral dissertation on March 19, 2007, and Henry Pao defended his doctoral dissertation on January 21, 2015.
Served on 19 PhD dissertation committees at JHU, served on 113 Graduate Board and Departmental Examination committees at JHU.
Taught 4,803 students in 97 courses at JHU and USM.

University Courses Taught

- At Johns Hopkins University, graduate courses: Matrix Analysis, Combinatorial Analysis, Graph Theory, Topics.
- At Johns Hopkins University, advanced undergraduate courses: Cryptology, Network Flows, Optimization I, Optimization II, Probability and Statistics (calculus-based), Numerical Linear Algebra, Graph Theory, Combinatorial Analysis.
- At Johns Hopkins University, introductory courses: Probability and Statistics (non calculus-based), Linear Algebra and Differential Equations, Discrete Mathematics.
- At University of Southern Maine, graduate/senior level courses: Numerical Analysis, Matrix Analysis, Graph Theory, Mathematical Modeling.
- At University of Southern Maine, introductory courses: Probability and Statistics.

Updated April 5, 2016