ROBERT W. GHRIST

CV

Departments of Mathematics &
Electrical / Systems Engineering
University of Pennsylvania

ghrist@math.upenn.edu
ghrist@seas.upenn.edu
www.math.upenn.edu/~ghrist

EDUCATION

Cornell University, Ithaca, NY
Ph.D. in Applied Mathematics **1995**
Dissertation: "*The Link of Periodic Orbits of a Flow*" ; Advisor: Philip Holmes

Cornell University, Ithaca, NY
M.S. in Applied Mathematics **1994**

University of Toledo, Toledo, OH
B.S. in Mechanical Engineering **1991**

AWARDS

Good Teaching Award *(University of Pennsylvania, Math)*	**2011**
S. Reid Warren Jr. teaching award *(University of Pennsylvania, SEAS)*	**2009**
Andrea Mitchell PIK University Professorship *(University of Pennsylvania)*	**2008**
Scientific American "Top 50" for research *(with V. de Silva)*	**2007**
Richard & Margaret Romano Professional Scholar *(University of Illinois)*	**2007**
University Scholar *(University of Illinois)*	**2007**
Presidential Early Career Award for Scientists & Engineers	**2004**
NSF CAREER Award	**2002**
Arnold O. Beckman Research Board Award *(University of Illinois)*	**2002**
Outstanding Young Faculty Award *(Sigma-Xi, Georgia Tech)*	**2000**
Freshman Partner of the Year *(Georgia Tech)*	**2000**
Undergraduate Teaching Award *(Mathematics, University of Texas, Austin)*	**1997**
NSF Postdoctoral Fellowship	**1995**
NSF Graduate Research Fellowship	**1991**

RESEARCH AREA

Topological Methods in Applied Mathematics

ACADEMIC APPOINTMENTS

Andrea Mitchell Penn Integrating Knowledge Professor **Fall 2008-present**
Departments of Mathematics and Electrical/Systems Engineering

Professor **Fall 2007-Summer 2008**
Department of Mathematics, Coordinated Science Laboratory,
Information Trust Institute; University of Illinois

Research Associate Professor **Spring 2007-Summer 2007**
Information Trust Institute, University of Illinois

Research Associate Professor **Fall 2004-Summer 2007**
Coordinated Science Laboratory, University of Illinois

Associate Professor — **Fall 2002-**
Department of Mathematics, University of Illinois — **Spring 2007**

Associate Professor — **Spring 2002-**
School of Mathematics, Georgia Institute of Technology — **Spring 2003**

Assistant Professor — **Fall 1998-**
School of Mathematics, Georgia Institute of Technology — **Spring 2002**

R. H. Bing Instructor — **Spring 1996-**
Department of Mathematics, University of Texas, Austin — **Spring 1998**

VISITING APPOINTMENTS

Dow Scholar — **Mar-Apr 2009**
Saginaw Valley State Univ., Michigan

Visitor — **Oct 2000**
Isaac Newton Institute, Cambridge University

Visitor — **Fall 1995**
Institute for Advanced Study, Princeton NJ

Exchange Scholar — **Fall 1994-**
PACM, Princeton University, Princeton NJ — **Fall 1995**

REFEREED PUBLICATIONS

1. J. Curry, R. Ghrist, and M. Robinson, "Euler calculus with applications to signals and sensing," *AMS Proc. Symp. Appl. Math.*, to appear.
2. M. Robinson and R. Ghrist, "Topological localization via signals of opportunity," *IEEE Trans. Sig. Proc.*, to appear.
3. P. Dlotko, M. Juda, M. Mrozek, and R. Ghrist, "Distributed computation of coverage in sensor networks by homological methods," *Applicable Algebra in Engineering, Communication and Computing*, to appear.
4. R. Ghrist and M. Robinson (2011) "Euler-Bessel and Euler-Fourier Transforms," *Inverse Problems,* 27(12), 124006.
5. Y. Baryshnikov, R. Ghrist, and D. Lipsky (2011) "Inversion of Euler integral transforms with applications to sensor data," *Inverse Problems,* 27(12), 124001.
6. M. Katsev, A. Yershova, B. Tovar, R. Ghrist, and S. LaValle (2011) "Mapping and Pursuit-Evasion Strategies For a Simple Wall-Following Robot," *IEEE Transactions on Robotics*, 27(1). 113-128.
7. Y. Baryshnikov and R. Ghrist (2010) "Euler integration for definable functions," *Proc. National Acad. Sci.*, 107(21), May 25, 9525-9530.
8. S. Alexander, R. Bishop, and R. Ghrist (2010) "Total curvature and simple pursuit on domains of curvature bounded above," *Geom. Dedicata*, 149(1), 275-290.
9. E. Chambers, V. de Silva, J. Erickson, and R. Ghrist (2010), "Rips complexes for planar point sets," *Disc. Comput. Geom.*, 44(1), 75-90.
10. R. Ghrist, "Configuration spaces, braids, and robotics," (2010) Lecture Note Series, Inst. Math. Sci., NUS, vol. 19, World Scientific, 263-304.

11. S. Alexander, R. Bishop, and R. Ghrist (2009) "Capture pursuit games on unbounded domains," *Ensiegn. Math.*, *55*, 103-125.
12. Y. Baryshnikov and R. Ghrist (2009) "Target enumeration via Euler characteristic integrals," *SIAM J. Appl. Math.*, 70(3), 825-844.
13. R. Ghrist and R. Vandervorst (2009) "Braids and parabolic scalar PDEs," *Transactions Amer. Math. Soc.*, 361, 2755-2788.
14. R. Ghrist (2008) "Barcodes: The persistent topology of data," *Bull. Amer. Math. Soc.*, 45(1) 61-75.
15. R. Ghrist (2007) "Winding numbers for networks with weak angular data," in Topology and Robotics, *Contemporary Mathematics,* AMS.
16. V. de Silva and R. Ghrist (2007) "Homological sensor networks," *Notices Amer. Math. Soc.*, 54(1), 10-17.
17. V. de Silva and R. Ghrist (2007) "Coverage in sensor networks via persistent homology," *Alg. & Geom. Topology*, 7, 339-–358.
18. R. Ghrist (2007) "On the contact geometry and topology of ideal fluids," *Handbook of Mathematical Fluid Dynamics,* Vol. IV., 1-38.
19. R. Ghrist and V. Peterson (2007) "The geometry and topology of reconfiguration," *Adv. Appl. Math.*, 38, 302–323.
20. V. de Silva and R. Ghrist (2006) "Coordinate-free coverage in sensor networks with controlled boundaries," *Intl. J. Robotics Research*, 25(12), 1205-1222.
21. R. Ghrist and S. LaValle (2006) "Nonpositive curvature and Pareto optimal motion planning," *SIAM J. Control & Opt.,* 45(5), 1697-1713.
22. E. Klavins, R. Ghrist, and D. Lipsky (2006) "The graph grammatical approach to self-organizing robotic systems," *IEEE Trans. Automatic Controls*, 51(6), 949-962.
23. R. Ghrist and R. Komendarczyk (2006) "Overtwisted energy-minimizing curl eigenfields," *Nonlinearity*, 19(1), 41-52.
24. R. Ghrist, J. O'Kane, and S. LaValle (2005) "Computing Pareto-optimal coordinations on roadmaps," *Intl. J. Robotics Research*, 12(11), 997-1010.
25. J. Etnyre and R. Ghrist (2005) "Generic hydrodynamic instability for curl eigenfields," *SIAM J. Appl. Dynamical Systems*, 4(2), 377-390.
26. A. Abrams and R. Ghrist (2004) "State complexes for metamorphic robots," *Intl. J. Robotics Research*, 23(7,8), 809-824.
27. R. Ghrist and E. Kin (2004) "Flowlines transervse to knot and link fibrations," *Pacific J. Math.*, 217(1), 61-86.
28. R. Ghrist, J.B.Van den Berg, and R.C. Vandervorst (2003) "Morse theory on braids with applications to Lagrangian systems," *Invent. Math.*, 152(2), 369-432.
29. J. Etnyre and R. Ghrist (2002) "Contact topology and hydrodynamics II: Solid tori," *Ergod. Thy. & Dyn. Sys.*, 22(3), 819-833.
30. J. Etnyre and R. Ghrist (2002) "Contact topology and Anosov flows," *Top. & its Appl.,* 124 (2), 211-219.
31. R. Ghrist and D. Koditschek (2002) "Safe cooperative robot dynamics on graphs," *SIAM J. Cont. & Opt.*, 40(5), 1556-1575.
32. A. Abrams and R. Ghrist (2002) "Finding topology in a factory: configuration space," *Amer. Math. Monthly*, 109, 140-150.
33. R. Ghrist and R. Komendarczyk (2002) "Topological features of inviscid flows," in *Introduction to the Geometry and Topology of Fluid Flows*, NATO-ASI Series II, vol. 47, Kluwer Press, 183-202.
34. J. Etnyre and R. Ghrist (2001) "An index for closed orbits in Beltrami fields," *Physica D*, 159(3-4), 180-189.

35. R. Ghrist (2001) "Steady nonintegrable high-dimensional fluids," *Lett. Math. Phys.,* 55(3), 193-204.
36. R. Ghrist (2001) "Configuration spaces of graphs and robotics," in *Braids, Links, and Mapping Class Groups: the Proceedings of Joan Birman's 70th Birthday*, AMS/IP Studies in Mathematics, vol. 24, 29-40.
37. R. Ghrist, J.B.Vandenberg, and R.C. Vandervorst (2000) "Closed characteristics of fourth-order twist systems via braids," *C. R. Acad. Sci. Paris Ser. I*, 331, 861-865.
38. J. Etnyre and R. Ghrist (2000) "Contact topology and hydrodynamics III: knotted orbits," *Trans. Amer. Math. Soc.*, 352, 5781-5794.
39. R. Ghrist (2000) "Resonant gluing bifurcations," *Intl. J. Bifurcation and Chaos*, 10(9), 2141-2160.
40. J. Etnyre and R. Ghrist (2000) "Contact topology and hydrodynamics I: Beltrami fields and the Seifert Conjecture," *Nonlinearity* 13, 441-458.
41. J. Etnyre and R. Ghrist (1999) "Plane field flows," *Comment. Math. Helv.*, 74, 507-529.
42. J. Etnyre and R. Ghrist (1999) "Construction of tight 3-manifolds via dynamics," *Proc. Amer. Math. Soc.*, 127, 3697-3706.
43. J. Etnyre and R. Ghrist (1999) "Stratified integrals and unknots in inviscid flows," *Cont. Math.,* 246, 99-112.
44. R. Ghrist and T. Young (1998) "From Morse-Smale to all links," *Nonlinearity*, 11, 1111-1125.
45. R. Ghrist (1998) "Chaotic knots and wild dynamics", *Chaos, Solitons, and Fractals*, 9(4/5), 583-598.
46. R. Ghrist (1997) "Branched 2-manifolds supporting all links," *Topology*, 36(2), 423-438.
47. R. Ghrist (1997) "Accumulations of infinite links," *Topology and its Applications*, 81, 171-184.
48. R. Ghrist and P. Holmes (1996) "An ODE whose solutions contain all knots," *Intl. J. Bifurcation and Chaos*, 6(5), 779-800.
49. R. Ghrist (1995) "Flows on S^3 supporting all links as orbits," *Electronic Research Announcements of the AMS*, 1(2), 91-97.

PROCEEDINGS

1. R. Ghrist and Y. Baryshnikov (2011) "Unimodal category and topological statistics," *Proc. NOLTA: Nonlinear Theory & Applications*.
2. R. Ghrist (2008) "Three examples of applied and computational homology," *Nieuw Archief voor Wiskunde* 5/9(2).
3. Y. Baryshnikov and R. Ghrist (2008) "Target enumeration via integration over planar sensor networks," in *Proc. Robotics: Science & Systems*.
4. J. Jung and R. Ghrist (2008) "Pareto optimal multi-robot coordination with acceleration constraints," in *Proc. Intl. Conf. Robotics & Automation*.
5. R. Ghrist (2006) "Braids and differential equations," in *Proc. International Congress of Mathematicians*, vol. III, 1-26.
6. R. Ghrist, D. Lipsky, S. Poduri, and G. Sukhatme (2006) "Node isolation in coordinate-free networks," in *Proc. Workshop on Algorithmic Foundations of Robotics*.
7. S. Alexander, R. Bishop, and R. Ghrist (2006) "Pursuit and evasion on non-convex domains of arbitrary dimensions," in *Proc. Robotics: Science & Systems*.
8. A. Yershova, B. Tovar, R. Ghrist, and S. LaValle (2005) "Bitbots: Simple robots solving complex tasks," in *Proc. AAAI.*

9. R. Ghrist and A. Muhammad (2005) "Coverage and hole detection in sensor networks via homology," in *Proc. Information Processing in Sensor Networks.*
10. V. de Silva, R. Ghrist, and A. Muhammad (2005) "Blind swarms for coverage in 2-d," in *Proc. Robotics, Systems and Science.*
11. R. Ghrist, J. O'Kane, and S. LaValle (2004) "Pareto optimal coordination on roadmaps," in *Proc. Workshop on Algorithmic Foundations of Robotics*, 2004.
12. R. Ghrist, and D. Lipsky (2004) "Grammatical self-assembly for planar tiles," in *Proc. Intl. Conf. on MEMS, Nano, and Smart Systems*.
13. E. Klavins, R. Ghrist, and D. Lipsky (2004) "Graph grammars for self-assembling robot systems," in *Proc. Intl. Conf. on Robotics & Automation*.
14. R. Ghrist (2002) "Shape complexes for metamorphic robots," in *Algorithmic Foundations of Robotics* V, J. Boissonnat et al. eds., *STAR 7*, Springer, 185-201.
15. R. Ghrist, E. Klavins, and D. Koditschek (2000) "Cyclic regulation of patterns," *Proc. Workshop on Algorithmic Foundations of Robotics*, B. Donald, K. Lynch, and D. Rus, eds., 205-220.
16. R. Ghrist and D. Koditschek (1999) "Safe Cooperative Robot Dynamics on Graphs," in *Hybrid Systems and AI: Modeling, Analysis and Control of Discrete and Continuous Systems*, AAAI, SS-99-05, 65-70.
17. R. Ghrist and D. Koditschek (1998) "Safe cooperative robot patterns via dynamics on graphs," *International Symposium on Robotics Research*, Y. Nakamura, Ed., Springer-Verlag, 81-92.
18. R. Ghrist and P. Holmes (1994) "Knotting within the gluing bifurcation," in *IUTAM Symposium on Nonlinearity and Chaos in Engineering Dynamics*, J. M. T. Thompson and S. R. Bishop, Ed., John Wiley Press, 299-315.
19. R. Ghrist and P. Holmes (1993) "Knots and orbit genealogies in three dimensional flows," in *Bifurcations and Periodic Orbits of Vector Fields*, NATO ASI Series C, Volume 408, Kluwer Academic Publishers, 185-239.

BOOKS AUTHORED

1. R. Ghrist, P. Holmes, and M. Sullivan (1997) *Knots and Links in Three-Dimensional Flows*, Lecture Notes in Mathematics, Volume 1654, Springer-Verlag.
2. R. Ghrist, *FLCT: Funny Little Calculus Text*, self-published: www.math.upenn.edu/~ghrist/FLCT/FLCT.pdf

BOOKS EDITED

1. M. Farber, R. Ghrist, M. Burger, and D. Koditschek, eds., (2007) *Topology and Robotics*, Contemporary Mathematics, American Mathematical Society.

PREPRINTS / IN PREPARATION

1. R. Ghrist, J.B. Van den Berg, R. Vandervorst, and W. Wojcik, "Braid Floer homology," submitted.
2. Y. Baryshnikov, R. Ghrist, and M. Wright, "Hadwiger's Theorem for data"
3. Y. Baryshnikov and R. Ghrist, "Unimodal category and the decomposition of distributions," preprint.
4. R. Ghrist and Y. Hiraoka, "Sheaves for network coding," in preparation.
5. R. Ghrist and S. Krishnan, "Network flow optimization via sheaves," in preparation.

6. R. Ghrist, *Applied Algebraic Topology & Sensor Networks*, a manu-script: `www.math.upenn.edu/~ghrist/preprints/ATSN.pdf`
7. R. Ghrist, *Elementary Applied Topology*, book in preparation.

GRANTS [LEAD PRINCIPAL INVESTIGATOR]

1. **Algebraic-Topological Structures for Hidden Modes** $360,000
   Office of Naval Research (12/2008-9/2012)
2. **Discrete Topological Imaging in Multibounce Environments** $120,000
   DARPA Strategic Technology Office (4/2009-4/2010)
3. **SToMP: Sensor Topology & Minimal Planning** $7,980,000
   DARPA Defense Sciences Office (10/2006-10/2011)
   8 co-PI institutions; >12 mathematicians, engineers, & scientists
4. **Topological Tools for Sensors & Systems** $200,000
   DARPA Defense Sciences Office (2/2005-2/2006)
   co-PI: S. LaValle, UIUC
5. **PECASE: Topological Methods in Applied Mathematics** $350,000
   NSF Division of Mathematical Sciences (6/2002-6/2007)
6. **Computational Topology of Configuration Spaces** $6,000
   A. O. Beckman Award, UIUC (9/2002-8/2003)
7. **The Topology of Hydrodynamics** $77,000
   NSF Division of Mathematical Sciences (6/1999-5/2002)
8. **Knotted Periodic Orbits in Dynamical Systems** $75,000
   NSF Postdoctoral Fellowship (9/1995-8/1998)

GRANTS [CO-PRINCIPAL INVESTIGATOR]

1. **ANTIDOTE: Adaptive Networks for Threat and Intrusion Detection Or Termination** $7,500,000
   ONR MURI (6/2009-5/2014)
   PI: G. Sukhatme, USC; co-PIs at Penn, USC, MIT, CMU
2. **Information Dynamics as Foundation for Network Management** $7,090,000
   AFOSR MURI (6/2009-5/2014)
   PI: R. Calderbank, Princeton; co-PIs at Princeton, Stanford, ASU, UWM, …
3. **SOLAR: Programming the Self-Assembly of Matter for Solar Energy Conversion** $500,000
   NSF DMS (9/2009-8/2012)
   PI: C. Kagan, Penn; co-PIs C. Epstein, C. Murray, V. Percec, Penn
4. **Fundamental Geodesic Problems in Computational Topology** $450,000
   NSF MSPA-MCS (8/2005-7/2008)
   PI: J. Erickson, UIUC; co-PI: S. LaValle, UIUC
5. **Multi-Scale Topological Analysis of Time-Evolving Shapes** $400,000
   DARPA-NSF CARGO program (6/2002-5/2005)
   PI: J. Rossignac, Georgia Tech; co-PIs: A. Szymczak, G. Turk, Georgia Tech
6. **Topological Methods in Nonlinear Dynamics** $38,000
   NSF East Asia & Pacific Program (6/2001-5/2004)
   PI: K. Mischaikow, Georgia Tech; co-PI: T. Gedeon, Montana

CONSULTING

1. **United Technologies Research Corporation**

Technical consulting Summer 2011-

2. **Finnegan, Henderson, Farabow, Garrett & Dunner, LLP**
   Legal consulting / expert witness Summer 2010
3. **Covington Burling, LLP**
   Legal consulting / expert witness Winter 2009

DISTINGUISHED ADDRESSES

Lecture	*Location*	*Date*
Plenary address, SIAM Applied Algebraic Geometry	Raleigh	Oct 8, 2011
Norbert Wiener Lectures (3 lectures)	Tufts	Apr 5-9, 2010
De Leeuw lecture	Stanford	Mar 11, 2010
Wing Lectures (3 lectures)	Rochester	Oct 21-23, 2009
CBMS lecture series (10 lectures) on Applied Algebraic Topology	Cleveland	Aug 3-8, 2009
IMA New Directions lecture series (10 lectures) on Applied Topology	Minneapolis	Jun 15-26, 2009
Plenary address, SIAM Intl. Conf. on Applied Dynamical Systems	Snowbird	May 18, 2009
Dow Scholar public lecture, Saginaw Valley State Univ.	Michigan	Apr 1, 2009
Keynote address, IEEE Intl. Conference on Autonomic Computing	Chicago	Jun 4 ,2008
IMS Tutorial Series on Robotics (2 lectures)	Singapore	Jun 18-19, 2007
RIMS Lecture Series on Sensor Networks (3 lectures)	Kyoto, JP	Jun12-14, 2007
AMS National Meeting, Current Events Bulletin	New Orleans	Jan 7, 2007
International Congress of Mathematicians, Dynamics Session	Madrid, SP	Aug 25, 2006
National Science Foundation MPS Distinguished Lecture	Arlington	Nov 15, 2004
AMS Invited Address Fall Sectional Meeting	Evanston	Oct 23, 2004
Journée de Rham	Lausanne, CH	Mar 10, 2004
Lecture Series on Topological Fluid Dynamics (3 lectures)	Dijon, FR	Jun 26-30, 2000

SELECTED INVITED LECTURES

Lecture	*Location*	*Date*
BUGCAT keynote address	Binghampton, NY	Nov 13, 2011
CATMI (Topology & Medical Imaging) lecture	Chipiona, Spain	Oct 18, 2011
NOLTA (Nonlinear Theory & Applications)	Kobe, Japan	Sep 5, 2011
Workshop on Applied Topology (4 lectures)	Hakata, Japan	Sep 1-4, 2011
IMA Summer School on Topological Methods	Penn	Jul 25-29, 2011
Applied Algebraic Topology Conference	ETH Zurich	Jul 4, 2011
Foundations of Computational Mathematics	Budapest	Jul 12, 2011
AMS MRC on Computational Topology (1 week)	Snowbord, UT	Jun 19-25
Army Research Office Strategic Planning	Raleigh, NC	May 24, 2011
Mathematics Colloquium	Ohio State University	May 12, 2011
Knots in Washington Workshop	George Mason University	Apr 29, 2011
Informatics Colloquium	University of Edinburgh	Apr 12, 2011
Topology Seminar	University of Texas, Austin	Mar 25, 2011
Dean's Lecture Series	Binghamton University	Mar 10, 2011
Applied Mathematics Colloquium	Princeton University	Feb 21, 2011
AMS Short Course in Applied Topology	New Orleans, LA	Jan 4-5, 2011
Electrical Engineering Colloquium	Harvard University	Oct 29, 2010
Workshop on Topology & Abstract Analysis	Youngstown, OH	Oct 16, 2010
Workshop on Topological/Geometric Controls	Madrid, Spain	Oct 4-6, 2011
Mathematics Colloquium	University of Toledo, OH	Sept 3, 2010
Engineering Colloquium	University of Toledo, OH	Sept 2, 2010
ATMCS conference	Muenster, Germany	Jun 24, 2010
Series on Geometric Topology (3 hours)	Colorado College, Colorado Springs, CO	Jun 10-12, 2010
Georgia Topology Conference	Univ. Georgia, Athens, GA	Jun 20, 2010
Spring school on Applied Topology (7 lectures)	University of Malaga, Spain	Jun 10-14, 2010

Lecture series (7 hours) on Braids	Universidad Compultense, Madrid, Spain	Jun 3-7,2010
Colloquium	APL, Baltimore, MD	Mar 24, 2010
Spring Topology & Dynamics Conference	Mississippi State University, MS	Mar 18, 2010
GETCO workshop	Aalborg, DK	Jan 12, 2010
Mathematics-Physics-CS Colloquium	UMass Boston, MA	Dec 1, 2009
Brown-BU Dynamics Seminar	BU, Boston, MA	Dec 2, 2009
National Forum of Young Topologists (2)	Tulane University, LA	Nov 13-4, 2009
Mathematics Colloquium	Penn State University, PA	Nov 12, 2009
Mathematics Colloquium	Temple University, PA	Nov 2, 2009
AMS Special Session on Dynamics	Boca Raton, FL	Oct 30, 2009
Summer School on Machine Learning	University of Chicago, IL	Jun 2, 2009
Workshop on Topology and Complex Systems	Rutgers University, NJ	Mar 4, 2009
AAAS Minisymposium	Chicago, IL	Feb 13, 2009
AMS National Special Sessions (2)	Washington DC	Jan 6, 2009
Computer Science Colloquium	Dartmouth University, NH	Nov 5, 2008
Workshop on Applied Algebraic Topology	Oberwolfach, DE	Jun 30, 2008
Robotics: Science & Systems	Zurich, CH	Jun 26, 2008
Mechanical Engineering Colloquium	Cornell University, NY	Mar 25, 2008
Mathematics Colloquium	Cornell University, NY	Mar 24, 2008
Mathematics Colloquium	University of Pennsylvania, PA	Mar 18, 2008
ESE Colloquium	University of Pennsylvania, PA	Mar 17, 2008
Mathematics Colloquium	Duke University, NC	Jan 17, 2008
SAMSI Workshop on Sensor Networks	SAMSI, Research Triangle, NC	Jan 15, 2008
DARPA TDA Annual Meeting	San Jose, CA	Dec 10, 2008
Workshop on Computational Geometry	IBM Watson Research Center, NY	Nov 9, 2007
AMS Special Session	Albuquerque, NM	Oct 14, 2007
Mathematical Sciences Lecture	Bell Labs / Alcatel, NJ	Aug 15, 2007
ICIAM Special Session	Zurich, CH	Jul 18, 2007
International Conference on Braids	National University Singapore	Jun 25, 2007
Aeronautics and Astronautics Colloquium	Purdue University, IN	Mar 29, 2007
MSRI Workshop on Applied Topology	MSRI	Sep 20, 2006
MSRI Workshop on Applied Topology	MSRI	Sep 6, 2006
MSRI Workshop on Applied Topology	MSRI	Sep 5, 2006
Robotics: Science & Systems	Philadelphia, PA	Aug 17, 2006
Workshop on Topology & Robotics	ETH [FIM] Zurich, CH	Jul 11, 2006
NSF Workshop on Sensor Networks	University of California, Santa Barbara	Jun 12, 2006
Conference on Dynamics & Topology	Będlewo, Poland	Jun 7 2006
Cornell Topology Festival	Cornell University, NY	May 21, 2006
Computational/Topological Dynamics	Leiden University, Netherlands	May 15, 2006
Mathematics Colloquium	University of Illinois, Chicago	Mar 3, 2006
Robotics Colloquium	Carnegie-Mellon University	Feb 22, 2006
Applied Mathematics Colloquium	Princeton University	Nov 14, 2005
Applied Dynamical Systems Workshop	Université Montréal	Oct 17, 2005
Foundations of Computational Mathematics	Santander, Spain	Jun 30, 2005
Robotics: Science & Systems	MIT	Jun 10, 2005
Applied Mathematics Seminar	University of Pennsylvania	May 20, 2005
Mathematics Colloquium	Institute for Advanced Study	May 19, 2005
Bay Area Topology Seminar	University of California, Davis	Apr 26, 2005
Spring Topology & Dynamics Conference	Berry College, Rome, GA	Mar 18, 2005
Dynamical Systems Seminar	Cornell University	Mar 7, 2005
Workshop on Visualization of Data	MSRI	Dec 12, 2004
Mathematics Colloquium	Indiana University	Dec 3, 2004
AMS Special Session	Evanston, IL	Oct 23, 2004
ICMENS Special Session	Banff, Canada	Aug 26, 2004
IUTAM Special Session	Warsaw, Poland	Aug 19, 2004
Algebraic Topological Methods in CS	University Western Ontario, London, CA	Aug 19, 2004
Applied Mathematics Colloquium	Northwestern University	Apr 23, 2004
Robotics Seminar	University of Pennsylvania	Apr 2, 2004

AMS Regional Meeting Special Session	Ohio University	Mar 27, 2004
Mathematics Colloquium	Université de Génève, Switzerland	Mar 11, 2004
AMS Regional Meeting Special Session	Phoenix, AZ	Jan 10, 2004
Geometry Seminar	Penn State University	Dec 10, 2003
Mathematics Colloquium	University Illinois, Chicago	Nov 10, 2003
Mathematics Colloquium	Université Jaume, Castellon, Spain	Oct 28, 2003
Workshop on Topological Robotics	ETH, Zurich Switzerland	Jun 24, 2003
Applied Mathematics Colloquium	University of Delaware	Apr 22, 2003
Midwest Dynamical Systems Meeting	Northwestern University	Apr 6, 2003
Spring Topology & Dynamics Conference	Texas Tech University	Mar 20, 2003
Control and Dynamical Systems Seminar	Cal Tech	Jan 8, 2003
Algorithmic Foundations of Robotics	Nice, France	Dec 15, 2002
AMS Sectional Meeting Special Session	Madison, WI	Oct 13, 2002
New Directions in Dynamical Systems	Kyoto University, Japan	Aug 10, 2002
Intl. Conf. Dynamics & DiffEqs	Wilmington, NC	May 25, 2002
DARPA/NSF CARGO Workshop	Newport, RI	May 20, 2002
Mathematics Colloquium	University of Wisconsin, Madison	Jan 23, 2002
Geometric Functional Analysis Seminar	Penn State University	Jan 18, 2002
Mathematics Colloquium	Penn State University	Jan 17, 2002
Mathematics Colloquium	University of Illinois	Nov 28, 2001
Florida Dynamics Conference	University of Florida	Nov 10, 2001
Mathematics Colloquium	University of Wisconsin, Madison	Oct 29, 2001
Geometry & Topology Seminar	University of Pennsylvania	Oct 11, 2001
Applied Mathematics Colloquia (2)	Cornell University	Mar 9-10, 2001
Mathematics Colloquium	University of Houston	Feb 14, 2001
Dynamical Systems Seminar	Leiden University, Netherlands	Dec 9, 2000
Dynamical Systems Seminar	Université Bourgogne, France	Nov 21, 2000
Dynamical Systems Seminar	Warwick University, UK	Nov 7, 2000
Mathematics Colloquium	University of Florida	Nov 1, 1999
Mathematics Colloquium	University of Southern Alabama	Oct 29, 1999
Georgia Topology Conference	University of Georgia, Athens	May 12, 1999
AMS Regional Meeting Special Session	Buffalo, NY	Apr 24, 1999
Midwest Dynamical Systems Conference	University of Michigan	Apr 17, 1999
AMS National Meeting Special Session	San Antonio, TX	Jan 14, 1999
Differential Equations Seminar	University of Michigan	Nov 18, 1998
AMS Regional Meeting Special Session	UNC Wake Forest	Oct 24, 1998
Mathematics Colloquium	University of Arizona	Sep 11, 1998
J. Birman's 70th Birthday Celebration	Columbia University	Mar 15, 1998
Spring Topology & Dynamics Conference	George Mason University	Mar 13, 1998
Dynamics Seminar	University of California, Berkeley	Dec 10, 1997
Applied Mathematics Colloquium	Cornell University	Dec 5, 1997
Topology Seminar	Cornell University	Dec 3, 1997
Applied Mathematics Colloquium	Princeton University	Nov 3, 1997
AMS Regional Meeting Special Session	University of Wisconsin, Milwaukee	Oct 25, 1997
Dynamics Seminar	Georgia Tech	Oct 16, 1997
Topology Seminar	University of Michigan	Sep 22, 1997
Midwest Dynamical Systems Conference	University of Minnesota	Sep 20, 1997
Dynamics Seminar	Northwestern University	Jun 7, 1997
Mathematics Colloquium	University of Montana	Apr 26, 1997
Mathematics Colloquium	Rice University	Jan 30, 1997
Workshop on Low-Dimensional Topology	MSRI	Jan 23, 1997
AMS Regional Meeting Special Session	Cal Tech	Nov 16, 1996
Intl. Workshop in Dynamics and Geometry	PUC, Rio de Janiero, Brasil	Aug 8, 1996
AMS Regional Meeting Special Session	University of Iowa	Mar 23, 1996
Georgia Topology Conference	University of Georgia	Aug 9, 1995
Dynamics Seminar	University of Texas, Austin	May 1, 1995
North-East Dynamics Conference	University of Connecticut	Apr 21, 1995
Mathematics Colloquium	University of Toledo	Feb 17, 1995

Dynamics Seminar	CUNY	Dec 6, 1994

PROFESSIONAL SERVICE

Member	Program Committee, Joint MAA-AMS Conference	2011–2012
Member	International Advisory Board, Spanish Network of Topology	2011–2015
Member	Board of Governors, Institute for Mathematics & Applications (IMA)	2009–2011
Organizer	IMA Summer School on Topology & Complex Systems	2010–2011
Organizer	Minisymposium on Data, AAAS Annual Meeting, Chicago, IL	Jan 2009
Member	Scientific Committee, Będlewo Conference on Dynamics & Topology	2008–2009
Member	Program Committee, WAFR robotics conference	2008
Member	Associate Editor Committee, IROS robotics conference	2008
Member	Program Committee, Robotics: Science & Systems	2008
Member	NSF DMS review panel	2007
Member	Editorial board, *SIAM Journal of Applied Dynamical Systems*	2007–2010
Member	Program Committee, SAMSI Program on Environmental Sensor Networks	2007
Member	American Mathematical Society Committee on Committees	2007–2009
Co-Organizer	ICIAM mini-symposium on Topology & Robotics	July 2007
Co-Organizer	ETH Workshop on Topology & Robotics	July 2006
Member	Editorial board, *Journal of Homology, Homotopy, & Applications*	2006–2011
Member	Scientific Committee, Będlewo Conference on Dynamics & Topology	2005–2006
Organizer	AMS Special Session on Mathematical Robotics	Oct 2004
Co-Editor	SIAM Dynamical Systems Activity Group web magazine	2004–2005
Member	DARPA panel on Current Trends in Mathematics	2004
Member	NSF DMS review panel	2004
Secretary/Treasurer	SIAM Dynamical Systems Activity Group	2003–2005
Co-organizer	SIAM Snowbird Conference Special Session on Topological Methods	May 2003
Member	NSF DMS review panel	2001
Member	Spring Topology & Dynamics Steering Committee	2001–2002
Co-organizer	Georgia Topology Conference (Athens, GA)	July 2000
Member	NSF DMS panel on Mathematics & Robotics	May 2000
Co-organizer	AMS Special Session on Contemporary Dynamics	Oct 1999
Co-organizer	ICIAM Special Session on Applications of Knot Theory in Dynamics	Oct 1997
Co-organizer	AMS Special Session on Flows	Oct 1997
Co-organizer	Midwest Dynamical Systems Conference, Austin TX	Feb/Mar 1997

UNIVERSITY SERVICE

Member	Penn Reading Program Committee	Fall 2011-present
Member	Integrated Studies Committee, SAS (Penn)	Fall 2009 – present
Member	Faculty Personnel Committee, SEAS (Penn)	Fall 2009 – present
Member	Mathematics AP Exams Committee (Penn)	Fall 2010 – present
Member	AMCS Graduate Admission Committee (Penn)	Fall 2009 – Spring 2011
Member	Mathematics Graduate Admission Committee (Penn)	Fall 2008 – Spring 2011
Member	Mathematics Strategic Senior Hiring Committee (UIUC)	Spring 2006 – Spring 2007
Member	Steering Committee: CAESAR (UIUC robotics center)	Fall 2006–
Member	Mathematics Chair Search Committee (UIUC)	Spring 2006
Member	Mathematics Grievance Committee (UIUC)	Fall 2005 – Spring 2007
Member	Faculty Senate (UIUC)	Summer 2004 – Spring 2006
Member	Mathematics Executive Committee (UIUC)	Summer 2003 – Spring 2005
Organizer	Reading Group [ALP] on Mathematical Robotics (UIUC)	Spring 2004
Co-organizer	Reading Group [RAP] on Computational Topology (UIUC)	Spring: 2003 – 2005
Co-organizer	Applied Mathematics Seminar (UIUC)	Fall: 2002 – 2004
Organizer	Reading Group [ALP] on Self-Assembly (UIUC)	Spring: 2003
Member	Mathematics Graduate Committee (Georgia Tech)	Fall 2001 – Spring 2002
Co-organizer	Gromov Seminar (Georgia Tech)	Fall: 2000 – 2001
Member	Mathematics Faculty Advisory Committee (Georgia Tech)	Fall 1999 – Spring 2001

Co-organizer	Dynamical Systems Seminar (Georgia Tech)	Fall 1998 – Spring 1999
Co-organizer	Topology/Geometry Seminar (Georgia Tech/Emory/UGA)	Fall 1998 – Spring 1999
Member	Introduction to Research Programming Committee (UT Austin)	Summer 1996 – Spring 1997
Organizer	Dynamical Systems Seminar (UT Austin)	Spring 1996 – Spring 1997

COURSES TAUGHT

Course title	Location	Level	Term
Calculus II for engineers 214	Penn	Undergraduate	Spring 2012
Applied Dynamical Systems 412	Penn	Undergraduate	Fall 2011
Calculus I for engineers 204	Penn	Undergraduate	Fall 2011
Calculus II for engineers 214	Penn	Undergraduate	Spring 2011
Applied Dynamical Systems 412	Penn	Undergraduate	Fall 2010
Calculus I for engineers 204	Penn	Undergraduate	Fall 2010
Applied Dynamical Systems 412	Penn	Undergraduate	Fall 2009
Calculus III for Engineers 240	Penn	Undergraduate	Spring 2009
Differential Geometry 501	Penn	Undergraduate	Spring 2009
Applied Algebraic Topology	Penn	Graduate	Fall 2008
Calculus for Engineers 231	UIUC	Undergraduate	Fall 2007
Honors Calculus for Engineers 243	UIUC	Undergraduate	Spring 2007
Honors Calculus for Engineers 231	UIUC	Undergraduate	Fall 2006
Honors Calculus for Engineers 243	UIUC	Undergraduate	Spring 2006
Honors Calculus for Engineers 231	UIUC	Undergraduate	Fall 2005
General Topology 535	UIUC	Graduate	Spring 2005
Geometric Topology 534	UIUC	Graduate	Fall 2004
Differentiable Manifolds 520	UIUC	Graduate	Fall 2004
Mathematical Methods in ECE	UIUC	Undergraduate	Fall 2004
Differential Equations II 385	UIUC	Undergraduate	Spring 2004
Algebraic Topology I 430	UIUC	Graduate	Fall 2003
Mathematical Methods in ECE	UIUC	Undergraduate	Fall 2003
Differential Equations II 385	UIUC	Undergraduate	Spring 2003
Differential Equations 341	UIUC	Undergraduate	Fall 2002
Calculus II 1502H	Georgia Tech	Undergraduate	Spring 2002
Honors Calculus III 2411A	Georgia Tech	Undergraduate	Spring 2002
Calculus I 1501N	Georgia Tech	Undergraduate	Fall 2001
Honors Calculus III 2411C	Georgia Tech	Undergraduate	Spring 2001
Calculus I 1501N	Georgia Tech	Undergraduate	Spring 2001
Calculus III 2401A	Georgia Tech	Undergraduate	Spring 2000
Algebraic Topology II 6442	Georgia Tech	Graduate	Spring 2000
Algebraic Topology 6441A	Georgia Tech	Graduate	Fall 1999
Symplectic Topology 8143C	Georgia Tech	Graduate	Spring 1999
Calculus II 1508C1	Georgia Tech	Undergraduate	Winter 1999
Differential Topology 8143B	Georgia Tech	Graduate	Winter 1999
Calculus I 1507N2	Georgia Tech	Undergraduate	Fall 1998
Point-Set Topology 8143A	Georgia Tech	Graduate	Fall 1998
Applied Dynamical Systems	UT Austin	Undergraduate	Spring 1998
Calculus I	UT Austin	Undergraduate	Spring 1997
Introductory Topology	UT Austin	Undergraduate	Fall 1997
Abstract Algebra	UT Austin	Undergraduate	Spring 1996
Experimental Mathematics	Moravia, NY	High School	Spring 1994

STUDENTS SUPERVISED

Name	Topic	Level	Time
S. Bhattacharya	Robot Motion Planning	Postdoc	2012 -
S. Krishnan	Applied Topology	Postdoc	2010 -
D. Lipsky	Applied Topology	Postdoc	2010 -

R. Sazdanovic	Topology	Postdoc	2010 -
Y. Cai	Networks & Communications	Ph.D.	2009 -
J. Curry	Applied Algebraic Topology	Ph.D.	2009 -
M. Robinson	Topological Imaging, Networks, & Sensing	Postdoc	2008 -2012
M. Wright	Algorithms for Euler Calculus	Ph.D.	2009 - 2011
A. Friend	Euler Numerical Analysis	Graduate	2009
V. Peterson	Geometry and Topology of Reconfiguration	Ph.D.	2004 - 2009
J. Jung	Pareto-Optimal Coordination in Robotics	Ph.D.	2004 - 2008
N. Siricki	Geodesics in Cat(0) spaces	Graduate	2005 – 2006
D. Lipsky	Topological Self - Assembly	Graduate	2004 – 2006
B. Sibley	Topological Matroids	Undergraduate	Spring 2006
T. Yang	Sensor Coverage and Homology	Undergraduate	Summer 2005
R. Komendarczyk	Spectral and Contact Geometry in Fluid Dynamics	Ph.D.	2000 - 2005
V. Shrikrishnan	Dihomotopy and Nonpositive Curvature	Undergraduate	Summer 2004
V. Morales-Duarte	Computing Configuration Spaces	Graduate	2000 – 2004
M. Wolak	Passive Assembly via Fences	Undergraduate	Fall 2003
K. Simon	Coordination Design for Robot Mechanisms	Undergraduate	Fall 2003
P. Szuta	Computational Topology of Sensors	Undergraduate	Summer 2003
T. Smith	Topology and High-Dimensional Automata	Undergraduate	Summer 2003
J. Grigaliunas	Controlled Self Assembly	Undergraduate	Spring 2003
A. Scukanec	Computational Homology for Robotics	Undergraduate	2001 – 2002
N. Bhakta	Computational Homology for Robotics	Undergraduate	2001 – 2002
K. Hamilton	Quasi Symmetry in Fluid Flows	Undergraduate	Spring 1998
K. Sexton	Dynamics of Coupled Oscillators	Undergraduate	1996 – 1997

PUBLIC OUTREACH

Event	*Location*	*Audience*	*Date*
Young Mathematicians Research Conference	Columbus, OH	undergraduates	Aug 20, 2011
International Science Festival	Edinburgh	general public	Apr 12, 2011
Saturday Morning Math Group	UT Austin	Middle/high school kids	Mar 26, 2011
Engaging Minds	London, UK	Penn alums	Jan 22, 2011
Engaging Minds	New York City	Penn alums	Dec 4, 2010
Pi Mu Epsilon Induction	Toledo, OH	undergraduates	Sept 2, 2010
Pi Mu Epsilon Induction	Villanova	undergraduates	Apr 23, 2010
SIAM regional meeting	Shippensburg, PA	undergraduates	Mar 20, 2010
Penn State MASS Colloquium	State College, PA	high school/undergrad	Nov 12, 2009
GVSU Dow Scholar Public Lecture	Saginaw, MI	undergraduates	Apr 1, 2009
Philomathean Society Lecture	Philadelphia, PA	undergraduates	Feb 19, 2009
AAAS Minisymposium Address	Chicago, IL	scientists & press	Jan 13, 2009
IMA "Math Matters" Public Address	Minneapolis, MN	general public	Jan 22, 2009
IMS Public Address	NUS, Singapore	general public	Jun 26, 2007
Math Awareness Week Keynote Address	Bryn Mawr	undergraduates	Apr 16, 2007
UIUC IBM day	Urbana, IL	industry	Oct 20, 2005
MAA EPADEL Meeting	Easton, PA	undergraduates	Apr 16, 2005
MASS Colloquium	Penn State	undergraduates	Sept 14, 2000
University of Georgia Math Club	Athens, GA	high school/undergrad	Mar 31, 1999
Georgia Tech CEISMC Lecture	Atlanta, GA	high school teachers	Nov 4, 1998
UT Saturday Morning Math Group (4 lectures)	Austin, TX	high school	1996-1998
High School Recruiting Program	Austin, TX	high school	Jul 19, 1996
Undergraduate Research Symposium	Toledo, OH	undergraduates	Nov 23, 1996
Cornell School Outreach Program	Moravia, NY	high school	1993-1994

PUBLICITY

Venue	*Description*	*Date*
Penn Engineering News	article on teaching award	Dec 2011
Under the Button	article on Funny Little Calculus Text	July 2011
Penn Office of the President	article on Integrated Studies Program	Feb 2011
SIAM News 42(10)	article on applied topology	Dec 2009
Penn News	article on PIK professorship	Jun 20, 2008
Scientific American 1/2008, p. 44	article of SciAm top 50 for 2007	Jan, 2008
Science News *171 (18) p. 282*	article on topological sensor networks	May 5, 2007
UIUC Inside Illinois *26 (17)*	announcement of 2007 University Scholar awardees	Apr 5 , 2007
AMS Press Release	announcement of article on sensor networks	Dec 5, 2006
Champaign News Gazette	article on DARPA SToMP program	Oct 17, 2006
Information Week	article on DARPA SToMP program	Oct 16, 2006
UIUC Inside Illinois	announcement of CAESAR robotics center	Oct 10, 2006
UIUC Press Release	announcement of DARPA SToMP program	Oct 5, 2006
UIUC Press Release	announcement of Ghrist's lecture at ICM	Aug 15, 2006
NSF Press Release	announcement of 2004 PECASE winners	May 4, 2004
Science *301 (5634) p. 756*	article on topology and robotics	Aug 8, 2003