

## CURRICULUM VITAE

THOMAS WANNER

### Education:

Dr.rer.nat.	(Ph.D.)	1993	Universität Augsburg (Germany), Mathematics
Diplom	(M.S.)	1991	Universität Augsburg, Mathematics, Computer Science
Vordiplom	(B.S.)	1989	Universität Augsburg, Mathematics, Computer Science

### Experience in Higher Education:

2011-	George Mason University, Professor
2004-2011	George Mason University, Associate Professor
2002-2004	George Mason University, Assistant Professor
2002-2004	University of Maryland, Baltimore County, Adjunct Assistant Professor
1998-2002	University of Maryland, Baltimore County, Assistant Professor
1997-1998	Universität Augsburg, Assistant Professor
1996-1997	Georgia Institute of Technology, Visiting Assistant Professor
1995-1996	Georgia Institute of Technology, Visiting Research Scholar
1993-1995	Universität Augsburg, Postdoctoral Fellow
1989-1993	Universität Augsburg, Teaching Assistant

### Visiting Appointments:

Summer 2022	International Centre for Mathematical Sciences, Edinburgh, Scotland
Fall 2017	Hausdorff Research Institute for Mathematics, Bonn, Germany
Spring 2014	Institute for Mathematics and its Applications, Minneapolis, Minnesota
Fall 2012	Institute for Mathematics and its Applications, Minneapolis, Minnesota
Summer 2010	Isaac Newton Institute, Cambridge, United Kingdom
Fall 2006	Mathematical Sciences Research Institute, Berkeley, California

### External Research Support:

2018-2024	Simons Foundation Collaboration Grant (Award 581334, \$42,000, PI), <i>Topological methods in dynamical systems</i>
2014-2018	National Science Foundation Grant (DMS-1407087, \$599,885, co-PI), <i>EXTREEMS-QED: Undergraduate research in computational and data-enabled mathematics</i>
2011-2015	National Science Foundation Grant (DMS-1114923, \$180,000, PI),

- Probabilistic methods in computational topology*
- 2009-2013 National Science Foundation Grant (DMS-0907818, \$105,000, PI),  
*A hybrid of theoretical and computational methods for bifurcation analysis*
- 2006-2012 National Science Foundation Grant (DMS-0639300, \$1,057,257, co-PI),  
*CSUMS: Development of an ongoing program of undergraduate computational mathematics research*
- 2005-2010 U.S. Department of Energy Grant (DOE-97889, \$297,833, PI),  
*Multiscale analysis of nonlinear systems using computational homology*
- 2004-2009 National Science Foundation Grant (DMS-0406231, \$100,002, PI),  
*Complex transient patterns in phase-field models*

### **Other Research Support and Fellowships:**

- 2014 Faculty Study Leave, GMU
- 2004 Provost's Tenure-Track Assistant Professor Leave, Spring Semester, GMU
- 2003 Provost's Award for Summer Research Funding, GMU
- 2001 Summer Support, DOE Grant (Curtis Menyuk, UMBC)
- 2000-2001 DRIF-RAS Grant, UMBC
- 1999 Summer Faculty Fellowship, UMBC
- 1996-1997 Research Fellowship Wa 960/3-2, Deutsche Forschungsgemeinschaft
- 1995-1996 Research Fellowship Wa 960/3-1, Deutsche Forschungsgemeinschaft
- 1991-1993 Ph.D. Fellowship, Deutsche Forschungsgemeinschaft
- 1989-1991 Fellowship of the Studienstiftung des deutschen Volkes

### **Publications:**

#### **Articles in refereed journals:**

1. Cyclic symmetry induced pitchfork bifurcations in the diblock copolymer model (with Peter Rizzi, Evelyn Sander). *Discrete and Continuous Dynamical Systems, Series B* 29(2), pp. 666–701, 2024.
2. Conley-Morse-Forman theory for generalized combinatorial multivector fields on finite topological spaces (with Michal Lipinski, Jacek Kubica, Marian Mrozek). *Journal of Applied and Computational Topology* 7(2), pp. 139–184, 2023.
3. A computer-assisted study of red coral population dynamics (with Sayomi Kamimoto, Hye Kyung Kim, Evelyn Sander). *Pure and Applied Functional Analysis* 7(4), pp. 1307–1337, 2022.
4. Equilibrium validation for triblock copolymers via inverse norm bounds for fourth-order elliptic operators (with Peter Rizzi, Evelyn Sander). *Communications in Nonlinear Science and Numerical Simulation* 115, Paper No. 106789, 27 pp, 2022.

5. Combinatorial vs. classical dynamics: Recurrence (with Marian Mrozek, Roman Srzednicki, Justin Thorpe). *Communications in Nonlinear Science and Numerical Simulation* 108, Paper No. 106226, 30 pp, 2022.
6. Creating semiflows on simplicial complexes from combinatorial vector fields (with Marian Mrozek). *Journal of Differential Equations* 304, pp. 375–434, 2021.
7. Equilibrium validation in models for pattern formation based on Sobolev embeddings (with Evelyn Sander). *Discrete and Continuous Dynamical Systems, Series B* 26(1), pp. 603–632, 2021.
8. Linking combinatorial and classical dynamics: Conley index and Morse decompositions (with Bogdan Batko, Tomasz Kaczynski, Marian Mrozek). *Foundations of Computational Mathematics* 20(5), pp. 967–1012, 2020.
9. A Lefschetz fixed point theorem for multivalued maps of finite spaces (with Jonathan Barmak, Marian Mrozek). *Mathematische Zeitschrift* 294(3–4), pp. 1477–1497, 2020.
10. Analyzing the squared distance-to-measure gradient flow system with  $k$ -order Voronoi diagrams (with Patrick O’Neil). *Discrete & Computational Geometry* 61(1), pp. 91–119, 2019.
11. Validated bounds on embedding constants for Sobolev space Banach algebras. *Mathematical Methods in the Applied Sciences* 41(18), pp. 9361–9376, 2018.
12. Computer-assisted proof of heteroclinic connections in the one-dimensional Ohta-Kawasaki model (with Jacek Cyranka). *SIAM Journal on Applied Dynamical Systems* 17(1), pp. 694–731, 2018.
13. Rigorous cubical approximation and persistent homology of continuous functions (with Pawel Dlotko). *Computers and Mathematics with Applications* 75(5), pp. 1648–1666, 2018.
14. Rigorous continuation of bifurcation points in the diblock copolymer equation (with Jean-Philippe Lessard, Evelyn Sander). *Journal of Computational Dynamics* 4(1–2), pp. 71–118, 2017.
15. Probabilistic estimates of the maximum norm of random Neumann Fourier series (with Dirk Blömker, Philipp Wacker). *Communications in Nonlinear Science and Numerical Simulation* 47, pp. 348–369, 2017.
16. Computer-assisted equilibrium validation for the diblock copolymer model. *Discrete and Continuous Dynamical Systems, Series A* 37(2), pp. 1075–1107, 2017.
17. Towards a formal tie between combinatorial and classical vector field dynamics (with Tomasz Kaczynski, Marian Mrozek). *Journal of Computational Dynamics* 3(1), pp. 17–50, 2016.
18. Validated saddle-node bifurcations and applications to lattice dynamical systems (with Evelyn Sander). *SIAM Journal on Applied Dynamical Systems* 15(3), pp. 1690–1733, 2016.
19. Topological microstructure analysis using persistence landscapes (with Pawel Dlotko). *Physica D: Nonlinear Phenomena* 334(1), pp. 60–81, 2016.
20. Degenerate nucleation in the Cahn-Hilliard-Cook model (with Dirk Blömker, Evelyn Sander). *SIAM Journal on Applied Dynamical Systems* 15(1), pp. 459–494, 2016.
21. Rigorous validation of isolating blocks for flows and their Conley indices (with Thomas Stephens). *SIAM Journal on Applied Dynamical Systems* 13(4), pp. 1847–1878, 2014.

22. A randomized subdivision algorithm for determining the topology of nodal sets (with Gregory S. Cochran, Pawel Dlotko). *SIAM Journal on Scientific Computing* 35(5), pp. B1034–B1054, 2013.
23. Branch interactions and long-term dynamics for the diblock copolymer model in one dimension (with Ian Johnson, Evelyn Sander). *Discrete and Continuous Dynamical Systems, Series A* 33(8), pp. 3671–3705, 2013.
24. Coreduction homology algorithm for regular CW-complexes (with Pawel Dlotko, Tomasz Kaczynski, Marian Mrozek). *Discrete & Computational Geometry* 46(2), pp. 361–388, 2011.
25. The dynamics of nucleation in stochastic Cahn-Morral systems (with Jonathan P. Desi, Hanein Edrees, Joseph J. Price, Evelyn Sander). *SIAM Journal on Applied Dynamical Systems* 10(2), pp. 707–743, 2011.
26. Coreduction homology algorithm for inclusions and persistent homology (with Marian Mrozek). *Computers and Mathematics with Applications* 60(10), pp. 2812–2833, 2010.
27. Topology-guided sampling of nonhomogeneous random processes (with Konstantin Mischaikow). *Annals of Applied Probability* 20(3), pp. 1068–1097, 2010.
28. Nucleation in the one-dimensional stochastic Cahn-Hilliard model (with Dirk Blömker, Bernhard Gawron). *Discrete and Continuous Dynamical Systems, Series A* 27(1), pp. 25–52, 2010.
29. Homology metrics for microstructure response fields in polycrystals (with Edwin R. Fuller, David M. Saylor). *Acta Materialia* 58(1), pp. 102–110, 2010.
30. Verified homology computations for nodal domains (with Sarah Day, William D. Kalies). *SIAM Journal on Multiscale Modeling & Simulation* 7(4), pp. 1695–1726, 2009.
31. A semi-implicit spectral method for stochastic nonlocal phase-field models (with Tina Hartley). *Discrete and Continuous Dynamical Systems, Series A* 25(2), pp. 399–429, 2009.
32. Rigorous numerics for the Cahn-Hilliard equation on the unit square (with Stanislaus Maier-Paape, Ulrich Miller, Konstantin Mischaikow). *Revista Matematica Complutense* 21(2), pp. 351–426, 2008.
33. Second phase spinodal decomposition for the Cahn-Hilliard-Cook equation (with Dirk Blömker, Stanislaus Maier-Paape). *Transactions of the American Mathematical Society* 360(1), pp. 449–489, 2008.
34. Probabilistic and numerical validation of homology computations for nodal domains (with Sarah Day, William D. Kalies, Konstantin Mischaikow). *Electronic Research Announcements of the American Mathematical Society* 13, pp. 60–73, 2007.
35. Structure of the attractor of the Cahn-Hilliard equation on a square (with Stanislaus Maier-Paape, Konstantin Mischaikow). *International Journal of Bifurcation and Chaos* 17(4), pp. 1221–1263, 2007.
36. A Hermite spectral method for the computation of homoclinic orbits and associated functionals (with Valeriy Korostyshevskiy). *Journal of Computational and Applied Mathematics* 206(2), pp. 986–1006, 2007.
37. Probabilistic validation of homology computations for nodal domains (with Konstantin Mischaikow). *Annals of Applied Probability*, 17(3), pp. 980–1018, 2007.

38. Complex transient patterns on the disk (with Jonathan P. Desi, Evelyn Sander). *Discrete and Continuous Dynamical Systems, Series A*, 15(4), pp. 1049–1078, 2006.
39. Topological simplification of nonautonomous difference equations (with Bernd Aulbach). *Journal of Difference Equations and Applications*, 12(3-4), pp. 283–296, 2006.
40. Evolution of pattern complexity in the Cahn-Hilliard theory of phase separation (with Marcio Gameiro, Konstantin Mischaikow). *Acta Materialia*, 53(3), pp. 693–704, 2005.
41. Maximum norms of random sums and transient pattern formation. *Transactions of the American Mathematical Society*, 356(6), pp. 2251–2279, 2004.
42. Polarization decorrelation in optical fibers with randomly varying elliptical birefringence (with Brian S. Marks, Curtis R. Menyuk, John Zweck). *Optics Letters*, 28(19), pp. 1799–1801, 2003.
43. Pattern formation in a nonlinear model for animal coats (with Evelyn Sander). *Journal of Differential Equations*, 191(1), pp. 143–174, 2003.
44. Invariant foliations and decoupling of non-autonomous difference equations (with Bernd Aulbach). *Journal of Difference Equations and Applications*, 9(5), pp. 459–472, 2003.
45. Existence and uniqueness of risk-sensitive estimates (with James Lo). *IEEE Transactions on Automatic Control*, 47(11), pp. 1945–1948, 2002.
46. Enstrophy dynamics of stochastically forced large-scale geophysical flows (with Dirk Blömker, Jinqiao Duan). *Journal of Mathematical Physics*, 43(5), pp. 2616–2626, 2002.
47. Roughness in surface growth equations (with Dirk Blömker, Stanislaus Maier-Paape). *Interfaces and Free Boundaries*, 3(4), pp. 465–484, 2001.
48. Spinodal decomposition for the Cahn-Hilliard-Cook equation (with Dirk Blömker, Stanislaus Maier-Paape). *Communications in Mathematical Physics*, 223(3), pp. 553–582, 2001.
49. Surface roughness in molecular beam epitaxy (with Dirk Blömker, Stanislaus Maier-Paape). *Stochastics and Dynamics*, 1(2), pp. 239–260, 2001.
50. Slow motion in higher-order systems and  $\Gamma$ -convergence in one space dimension (with William D. Kalies, Robert C.A.M. VanderVorst). *Nonlinear Analysis: Theory, Methods, and Applications*, 44(1), pp. 33–57, 2001.
51. Unexpectedly linear behavior for the Cahn-Hilliard equation (with Evelyn Sander). *SIAM Journal on Applied Mathematics*, 60(6), pp. 2182–2202, 2000.
52. The Hartman-Grobman theorem for Caratheodory type differential equations in Banach spaces (with Bernd Aulbach). *Nonlinear Analysis: Theory, Methods, and Applications*, 40(1-8), pp. 91–104, 2000.
53. Spinodal decomposition for multicomponent Cahn-Hilliard systems (with Stanislaus Maier-Paape, Barbara Stoth). *Journal of Statistical Physics*, 98(3-4), pp. 871–896, 2000.
54. Spinodal decomposition for the Cahn-Hilliard equation in higher dimensions: Nonlinear dynamics (with Stanislaus Maier-Paape). *Archive for Rational Mechanics and Analysis*, 151(3), pp. 187–219, 2000.
55. Monte Carlo simulations for spinodal decomposition (with Evelyn Sander). *Journal of Statistical Physics* 95(5-6), pp. 925–948, 1999.

56. Dissipative quasigeostrophic dynamics under random forcing (with James R. Brannan, Jinqiao Duan). *Journal of Mathematical Analysis and Applications* 228(1), pp. 221–233, 1998.
57. Spinodal decomposition for the Cahn-Hilliard equation in higher dimensions. Part I: Probability and wavelength estimate (with Stanislaus Maier-Paape). *Communications in Mathematical Physics* 195(2), pp. 435–464, 1998.
58. Solutions of nonlinear planar elliptic problems with triangle symmetry (with Stanislaus Maier-Paape). *Journal of Differential Equations* 136(1), pp. 1–34, 1997.
59. Perturbation of doubly periodic solution branches with applications to the Cahn-Hilliard equation (with Paul C. Fife, Hansjörg Kielhöfer, Stanislaus Maier-Paape). *Physica D: Nonlinear Phenomena* 100(3-4), pp. 257–278, 1997.
60. Linearization of random dynamical systems. *Dynamics Reported* 4, pp. 203–269, 1995.
61. Supersolvable and modularly complemented matroid extensions (with Günter M. Ziegler). *European Journal of Combinatorics* 12(4), pp. 341–360, 1991.
62. On the chromaticity of certain subgraphs of a q-tree. *Journal of Graph Theory* 13(5), pp. 597–605, 1989.

**Book chapters:**

63. Computer-assisted bifurcation diagram validation and applications in materials science. *Proceedings of Symposia in Applied Mathematics*, Vol. 74, pp. 123–174. American Mathematical Society, Providence, 2018.
64. Topological analysis of the diblock copolymer equation. In: Y. Nishiura, M. Kotani (editors), *Mathematical Challenges in a New Phase of Materials Science*, Springer Proceedings in Mathematics & Statistics 166, pp. 27–51, Springer-Verlag, 2016.
65. Phase separation in stochastic Cahn-Hilliard models (with Dirk Blömker, Stanislaus Maier-Paape). *Mathematical Methods and Models in Phase Transitions*, edited by A. Miranville, pp. 1–41. Nova Science Publishers, 2005.
66. Invariant foliations for Caratheodory type differential equations in Banach spaces (with Bernd Aulbach). *Advances in Stability Theory at the End of the 20th Century*, edited by A.A. Martynyuk, *Stability and Control: Theory, Methods and Applications*, Vol. 13, pp. 1–14. Taylor and Francis, London, 2003.
67. Integral manifolds for Caratheodory type differential equations in Banach spaces (with Bernd Aulbach). *Six Lectures on Dynamical Systems*, edited by B. Aulbach and F. Colonius, pp. 45–119. World Scientific, Singapore, 1996.

**Articles in proceedings:**

68. Polarization mode dispersion, decorrelation, and diffusion in optical fibers with randomly varying elliptical birefringence (with Brian S. Marks, Curtis R. Menyuk, John Zweck). *Optical Fiber Communication Conference 2003*, Technical Digest, pp. 370–372, 2003.

69. Spinodal decomposition: A survey of recent results (with Stanislaus Maier-Paape, Evelyn Sander). In: B. Fiedler, K. Gröger, and J. Sprekels (editors), *Equadiff 99, Proceedings of the International Conference on Differential Equations*, Volume 2, pp. 1288–1299, World Scientific, 2000.
70. Spinodal decomposition for the stochastic Cahn-Hilliard equation (with Dirk Blömker, Stanislaus Maier-Paape). In: B. Fiedler, K. Gröger, and J. Sprekels (editors), *Equadiff 99, Proceedings of the International Conference on Differential Equations*, Volume 2, pp. 1265–1267, World Scientific, 2000.
71. Spinodal decomposition in the linear Cahn-Hilliard model (with Stanislaus Maier-Paape). *Zeitschrift für Angewandte Mathematik und Mechanik* 78(S3), pp. S1003–S1004, 1998.
72. Qualitative behavior of random differential equations. In: D. Bainov and A. Dishliev (editors), *Proceedings of the Fifth International Colloquium on Differential Equations*, Volume 2, pp. 242–257, SCT Publishing, 1995.

**Miscellaneous writings:**

73. Editorial: Topology in dynamics, differential equations, and data (with Sarah Day, Robert C.A.M. VanderVorst). *Physica D: Nonlinear Phenomena* 334(1), pp. 1–3, 2016.
74. Review of *Computational Homology* by T. Kaczynski, K. Mischaikow, and M. Mrozek. *SIAM Review*, 48(1), pp. 202–204, 2006.

**Theses:**

75. Zur Linearisierung zufälliger dynamischer Systeme. *Ph.D. thesis*, Universität Augsburg, Germany, 172 pages, 1993.
76. Invariante Faserbündel und topologische Äquivalenz bei dynamischen Prozessen. *M.S. thesis*, Universität Augsburg, Germany, 135 pages, 1991.

**Manuscripts submitted for publication:**

77. Connection matrices in combinatorial topological dynamics (with Marian Mrozek). Preprint, 115 pages.
78. Conley index for multivalued maps on finite topological spaces (with Jonathan Barmak, Marian Mrozek). Preprint, 43 pages.

**Manuscripts in preparation:**

79. Theory and Numerics of Partial Differential Equations (with Evelyn Sander). Book manuscript, 949 pages.

**Graduate Students, Ph.D.:**

- current Justin Thorpe, Ph.D. in Mathematics, in progress.
- 2022 Peter Rizzi: *On Validated Equilibria and Bifurcations in Materials Science and Stochastic Dynamics*,  
Ph.D. in Mathematics, GMU.
- 2017 Patrick O'Neil: *Analyzing and Extending the Distance-to-Measure Gradient Flow using Higher Order Voronoi Diagrams*,  
Ph.D. in Mathematics, GMU.
- 2016 Thomas Stephens: *Topological Methods for Evolution Equations*,  
Ph.D. in Mathematics, GMU.
- 2011 Gregory S. Cochran: *Optimal Sampling of Random Fields for Topological Analysis*,  
Ph.D. in Mathematics, GMU.
- 2009 Andrew Corrigan: *Kernel-Based Meshless Methods*,  
Ph.D. in Computational Mathematics, GMU.
- 2008 Tina R. Hartley: *An Analysis of Phase Separation Processes for Stochastic and Nonlocal Extensions of the Classical Phase-Field Model*,  
Ph.D. in Computational Mathematics, GMU.
- 2005 Valeriy R. Korostyshevskiy: *A Hermite Spectral Approach to Homoclinic Solutions of Ordinary Differential Equations*,  
Ph.D. in Applied Mathematics, UMBC.

**Graduate Students, M.S.:**

- current Sumanth Ravipati, M.S. in Mathematics, in progress.
- 2021 Lauren Joyave: *Nonsmooth Frameworks for an Extended Budyko Model*,  
M.S. in Mathematics, GMU.
- 2017 Mahendra Panagoda: *Swarm Dynamics and Mean-Field Games*,  
M.S. in Mathematics, GMU.
- 2011 Mike Atkins: *Long Term Dynamics of the Di-Block Copolymer Model on Higher Dimensional Domains*, M.S. in Mathematics, GMU.
- 2008 Elan Rodan: *Successive Continuation for Locating Connecting Orbits*,  
M.S. in Mathematics, GMU.
- 2004 Jonathan P. Desi: *A Study of the Cahn-Hilliard Equation on the Unit Disk*,  
M.S. in Applied Mathematics, UMBC.
- 2002 Jennifer E. Deering: *Computation of the Bifurcation Structure of the Cahn-Hilliard Equation*, M.S. in Applied Mathematics, UMBC.

**Undergraduate Students:**

- 2018 Micheal Belete: *Stable Annulus Solution for the Diblock Copolymer Equation*,  
EXTREEMS Undergraduate Research Project, GMU.



- 2018 Andrew Hornstra: *Diblock Copolymer Modeling in 3D*, EXTREEMS Undergraduate Research Project, GMU.
- 2017 Hye Kyung Kim: *Dynamics of Red Coral Populations*, EXTREEMS Undergraduate Research Project, GMU.
- 2016 Harout Boujakjian: *Meta-Stability of the Allen-Cahn Fractional Differential Equation*, MEGL Undergraduate Research Project, GMU.
- 2016 Kathleen McLane: *Meta-Stability of the Allen-Cahn Fractional Differential Equation*, MEGL Undergraduate Research Project, GMU.
- 2016 Conor Nelson: *Meta-Stability of the Allen-Cahn Fractional Differential Equation*, MEGL Undergraduate Research Project, GMU.
- 2015 James Trichilo: *Frequency Domain Analysis of the Diblock Copolymer Equation*, EXTREEMS Undergraduate Research Project, GMU.
- 2014 Mahmoud Namazi: *Nucleation in a Two-Component Metal Alloy*, CSUMS Undergraduate Research Project, GMU.
- 2013 Kalea Sebesta: *Nucleation in a Two-Component Metal Alloy*, REU Undergraduate Research Project, GMU.
- 2011 Ian Johnson: *Continuation Analysis for the Diblock-Copolymer Equation in One Dimension*, CSUMS Undergraduate Research Project, GMU.
- 2010 Olga Stulov: *Stability of Equilibria in 1D for the Diblock-Copolymer Equation*, REU Undergraduate Research Project, GMU.
- 2010 James O'Beirne: *The Dynamics of Nucleation in Stochastic Cahn-Morral Systems*, CSUMS Undergraduate Research Project, GMU.
- 2009 Colleen Ackerman: *The Dynamics of Nucleation in Stochastic Cahn-Morral Systems*, REU Undergraduate Research Project, GMU.
- 2009 William Hardesty: *The Dynamics of Nucleation in Stochastic Cahn-Morral Systems*, REU Undergraduate Research Project, GMU.
- 2009 Thomas Stephens: *Nonlocal Extensions of the Classical Phase Field Model*, CSUMS Undergraduate Research Project, GMU.
- 2008 Hanein Edrees: *The Dynamics of Nucleation in Stochastic Cahn-Morral Systems*, CSUMS Undergraduate Research Project, GMU.
- 2008 Jonathan Price: *The Dynamics of Nucleation in Stochastic Cahn-Morral Systems*, CSUMS Undergraduate Research Project, GMU.
- 2005 Ravi Kappiyoor: *Microstructure Response Isosurfaces for Low Thermal Expansion Polycrystals*, Summer Research Project, GMU & NIST.
- 2003 Eli Leyman: *Solidification Phenomena in Pure Materials*, Summer Research Project, GMU.
- 2003 Jonathan P. Desi: *A Numerical Study of Nucleation in Stochastic Cahn-Morral Systems*, Undergraduate Senior Thesis, UMBC.

**Courses Taught:**

George Mason University:

Fall 2024	Math 675	Linear Analysis
	Math 697	Global Dynamics via Analysis and Topology
	Math 999	Doctoral Dissertation
Spring 2024	Math 686	Numerical Solution of Differential Equations
	Math 697	Bifurcation Theory in Partial Differential Equations
	Math 697	Computer Validation
	Math 999	Doctoral Dissertation
Fall 2023	Math 213	Analytic Geometry and Calculus III
	Math 413	Modern Applied Mathematics I
	Math 999	Doctoral Dissertation
Spring 2023	Math 214	Elementary Differential Equations
	Math 631	Topology
	Math 999	Doctoral Dissertation
Fall 2022	Math 214	Elementary Differential Equations
	Math 678	Partial Differential Equations
	Math 999	Doctoral Dissertation
Summer 2022	Math 999	Doctoral Dissertation
Spring 2022	Math 999	Doctoral Dissertation (two sections)
Fall 2021	Math 213	Analytic Geometry and Calculus III
	Math 413	Modern Applied Mathematics I
	Math 998	Dissertation Proposal
	Math 999	Doctoral Dissertation
Spring 2021	Math 213	Analytic Geometry and Calculus III
	Math 431	Topology
	Math 697	Mathematics & Climate (Reading course)
	Math 998	Dissertation Proposal (two sections)
Fall 2020	Math 213	Analytic Geometry and Calculus III (two sections)
	Math 998	Dissertation Proposal
Spring 2020	Math 213	Analytic Geometry and Calculus III
	Math 625	Numerical Linear Algebra
	Math 697	Computational Topology (Reading course)
Fall 2019	Math 213	Analytic Geometry and Calculus III
	Math 675	Linear Analysis I
	Math 697	Rigorous Computations for PDEs (Reading course)
Summer 2019	Math 697	Mathematics & Climate (Reading course)
Spring 2019	Math 213	Analytic Geometry and Calculus III
	Math 784	Nonlinear Functional Analysis
	Math 697	Seminar on Mathematics & Climate

Fall 2018	Math 478	Introduction to PDEs with Numerical Methods
	Math 677	Ordinary Differential Equations
Spring 2018	Math 406	Honors Thesis in Mathematics II
	Math 689	Bifurcation Theory
Fall 2017	Math 213	Analytic Geometry and Calculus III
	Math 405	Honors Thesis in Mathematics
	Math 675	Linear Analysis I
Spring 2017	Math 214	Elementary Differential Equations
	Math 784	Nonlinear Functional Analysis
Fall 2016	Math 213	Analytic Geometry and Calculus III
	Math 478	Introduction to PDEs with Numerical Methods
Spring 2016	Math 213	Analytic Geometry and Calculus III
	Math 625	Numerical Linear Algebra
Fall 2015	Math 213	Analytic Geometry and Calculus III
	Math 405	Honors Thesis in Mathematics
	Math 677	Ordinary Differential Equations
Spring 2015	Math 446	Numerical Analysis I
	Math 689	Computational Topology
	Math 795	Graduate Seminar
Fall 2014	Math 213	Analytic Geometry and Calculus III
	Math 478	Introduction to PDEs with Numerical Methods
Fall 2013	Math 214	Elementary Differential Equations
	Math 678	Partial Differential Equations
Summer 2013	Math 478	Introduction to PDEs with Numerical Methods
Spring 2013	Math 214	Elementary Differential Equations
	Math 784	Nonlinear Functional Analysis
Spring 2012	Math 315	Advanced Calculus I
	Math 625	Numerical Linear Algebra
Fall 2011	Math 213	Analytic Geometry and Calculus III
	Math 781	Advanced Methods in Applied Mathematics
Summer 2011	Math 478	Introduction to PDEs with Numerical Methods
Spring 2011	Math 125	Discrete Mathematics I
	Math 689	Evolution Equations
Fall 2010	Math 675	Linear Analysis I
Summer 2010	Math 493	Topics in Applicable Mathematics
Spring 2010	Math 114	Analytic Geometry and Calculus II
	Math 686	Numerical Solution of Differential Equations
Fall 2009	Math 213	Analytic Geometry and Calculus III
	Math 781	Advanced Methods in Applied Mathematics
Spring 2009	Math 213	Analytic Geometry and Calculus III
	Math 625	Numerical Linear Algebra
Fall 2008	Math 685	Numerical Analysis

Spring 2008	Math 214	Elementary Differential Equations
	Math 678	Partial Differential Equations
Fall 2007	Math 677	Ordinary Differential Equations
Summer 2007	Math 493	Topics in Applicable Mathematics
Spring 2007	Math 625	Numerical Linear Algebra
	Math 689	Nonlinear Functional Analysis
Spring 2006	Math 114	Analytic Geometry and Calculus II
	Math 686	Numerical Solution of Differential Equations
Fall 2005	Math 685	Numerical Analysis
Spring 2005	Math 108	Introductory Calculus with Business Applications
	Math 214	Elementary Differential Equations
Fall 2004	Math 113	Analytic Geometry and Calculus I
	Math 689	Computational Algebraic Topology
Fall 2003	Math 111	Linear Mathematical Modeling
	Math 675	Linear Analysis I
Spring 2003	Math 414	Modern Applied Mathematics II
	Math 673	Dynamical Systems
Fall 2002	Math 213	Analytic Geometry and Calculus III
	Math 446	Numerical Analysis I

## University of Maryland, Baltimore County:

Spring 2002	Math 302	Introduction to Mathematical Analysis II
	Math 601	Measure Theory
Fall 2001	Math 301	Introduction to Mathematical Analysis I (two sections)
	Math 699	Introduction to Conley Index Theory (Reading course)
Spring 2001	Math 302	Introduction to Mathematical Analysis II
	Math 612	Ordinary Differential Equations and Dynamical Systems
	Math 699	Introduction to Algebraic Topology (Reading course)
Fall 2000	Math 221	Introduction to Linear Algebra
	Math 301	Introduction to Mathematical Analysis I
	Math 699	Practical Bifurcation and Stability Analysis (Reading course)
Spring 2000	Math 225	Introduction to Differential Equations
	Math 710	Nonlinear Functional Analysis
Fall 1999	Math 251	Multivariable Calculus
	Math 251	Multivariable Calculus (Honors section)
	Math 614	Partial Differential Equations
	Math 699	Introduction to Conley Index Theory (Reading course)
Spring 1999	Math 152	Calculus and Analytic Geometry II
	Math 611	Applied Analysis
Fall 1998	Math 699	Introduction to Algebraic Topology (Reading course)
	Math 151	Calculus and Analytic Geometry I

**Professional Activities:**

- Member of AMS, SIAM, MAA, DMV (German Mathematical Society), EMS (European Mathematical Society).
- Editorial Board Member of
  - *Frontiers in Applied Dynamical Systems* (since 2015),
  - *SIAM Journal on Applied Dynamical Systems* (since 2015),
  - *Discrete and Continuous Dynamical Systems, Series B* (since 2012),
  - *Mathematical Methods in the Applied Sciences* (since 2009),
  - *Physica D: Nonlinear Phenomena* (2010–2023),
  - *Discrete and Continuous Dynamical Systems, Series S* (2007–2012).
- Referee for *Advances in Computational Mathematics, Applied Mathematics and Computation, Communications on Pure and Applied Mathematics, Computational Geometry: Theory and Applications, Computer Methods in Applied Mechanics and Engineering, Discrete and Continuous Dynamical Systems, European Journal of Applied Mathematics, Foundations of Computational Mathematics, International Journal of Mathematics and Mathematical Sciences, Interfaces and Free Boundaries, Journal of Computational and Applied Mathematics, Journal of Computational Dynamics, Journal of Differential Equations, Journal of Dynamics and Differential Equations, Journal of Graph Theory, Journal of Mathematical Analysis and Applications, Journal of Physics A, Journal of Sound and Vibration, Nonlinear Analysis, Nonlinearity, Physica D, Proceedings of the American Mathematical Society, Proceedings of Symposia in Applied Mathematics, Random & Computational Dynamics, SIAM Journal on Applied Dynamical Systems, SIAM Journal on Applied Mathematics, SIAM Journal on Mathematical Analysis, SIAM Journal on Numerical Analysis, SIAM Journal on Scientific Computing, SIAM Review, Stochastics and Dynamics, Stochastics and Stochastics Reports, Topological Methods in Nonlinear Analysis, Transactions of the AMS, Zeitschrift für Angewandte Mathematik und Mechanik.*
- Book proposal reviewer for *American Mathematical Society, Cambridge University Press, Springer-Verlag.*
- Panelist for the *National Science Foundation.*
- Grant reviewer for *National Science Foundation, Department of Energy, Chilean Science Foundation, Dutch Science Foundation, Israel Science Foundation, Portuguese Science Foundation, National Science Centre of Poland, Simons Foundation.*
- Co-Editor of a special issue of *Physica D* on “Topology in dynamics, differential equations, and data” (2014 – 2016).
- Organizer of various minisymposia, special sessions, and workshops:

- Workshop on *Combinatorial Topological Framework for Nonlinear Dynamics*, CRM, Montreal, Canada (October 2024).
  - Minisymposium on *Combinatorial Topological Dynamics*, ICIAM 23: International Congress on Industrial and Applied Mathematics, Tokyo, Japan (August 2023).
  - Session on *Computational Dynamics in the Context of Data*, ICMC Summer Meeting on Differential Equations, Sao Carlos, Brazil (February 2019).
  - Workshop on *Combinatorics, Enumeration, and Invariant Theory*, George Mason University, Fairfax, Virginia (March 2010).
  - Workshop on *Computational Topology and Dynamics*, Montana State University, Bozeman, Montana (August 2008).
  - Minisymposium on *Computational Topology and Dynamics*, ICIAM 07: 6th International Congress on Industrial and Applied Mathematics, Zürich, Switzerland (July 2007).
  - Minisymposium on *Stochastic Partial Differential Equations and Pattern Formation*, SIAM Conference on Applications of Dynamical Systems, Snowbird, Utah (May 2007).
  - Special session on *Formation and Dynamics of Patterns in Evolution Equations*, AIMS Conference on Dynamical Systems, Differential Equations and Applications, Poitiers, France (June 2006).
  - Workshop on *Computational Homology and Materials Science*, Georgia Institute of Technology, Atlanta, Georgia (February 2006).
  - Minisymposium on *Topological Analysis of Patterns*, SIAM Conference on Applications of Dynamical Systems, Snowbird, Utah (May 2005).
  - Minisymposium on *Stochastic Differential Equations: Dynamics and Applications*, SIAM Conference on Applications of Dynamical Systems, Snowbird, Utah (May 2001).
  - Minisymposium on *Pattern formation in the Cahn-Hilliard model*, SIAM Conference on Applications of Dynamical Systems, Snowbird, Utah (May 1999).
- Invited lectures and conference presentations:
    1. “Capturing invariance in flows and combinatorial vector fields.” Topology Seminar, Universidad de Buenos Aires, Online Talk (November 15, 2023).
    2. “Bifurcation points induced by cyclic symmetries.” 29th Nordic Congress of Mathematicians with EMS, Aalborg, Denmark (July 5, 2023).
    3. “Bifurcation points induced by cyclic symmetries.” Computational Mathematics Seminar, Jagiellonian University, Krakow, Poland (May 11, 2023).
    4. “Bifurcation points induced by cyclic symmetries.” Applied & Computational Mathematics Seminar, Rutgers University, Piscataway, New Jersey (April 25, 2023).

5. “Combinatorial topological dynamics.” Applied & Computational Mathematics Seminar, Georgia Institute of Technology, Atlanta, Georgia (November 7, 2022).
6. “Combinatorial topological dynamics.” DyToComp 2022: Dynamics, Topology, and Computations, Bedlewo, Poland (June 21, 2022).
7. “From discrete Morse theory to combinatorial topological dynamics” (Tutorial talk). GETCO: 11th International Conference on Geometric and Topological Methods in Computer Science, Paris, France (May 31, 2022).
8. “Equilibrium validation in models for pattern formation based on Sobolev embeddings.” SIAM Conference on Applications of Dynamical Systems, Virtual Conference (May 23, 2021).
9. “Bifurcation points in the Ohta-Kawasaki model.” CRM CAMP in Nonlinear Analysis Seminar, Online Talk (May 18, 2021).
10. “A computer-assisted study of the diblock copolymer model.” Mathematics Colloquium, Swansea University, Swansea, Wales (December 12, 2019).
11. “Combinatorial topological dynamics.” EquaDiff 2019, Leiden, Netherlands (July 8, 2019).
12. “Creating semiflows on simplicial complexes from combinatorial vector fields.” Seminar on Computational Mathematics, Jagiellonian University, Krakow, Poland (May 16, 2019).
13. “Creating semiflows on simplicial complexes from combinatorial vector fields.” Combinatorial/Algebraic Topological Approaches to Nonlinear and Data Driven Dynamics, CRM, Montreal, Canada (April 16, 2019).
14. “Capturing invariance in flows and combinatorial vector fields.” Topology, Algebraic Geometry and Dynamics Seminar, George Mason University, Fairfax, Virginia (March 22, 2019).
15. “Combinatorial topological dynamics I: Linking combinatorial and classical dynamics.” ICMC Summer Meeting on Differential Equations, Sao Carlos, Brazil (February 5, 2019).
16. “Bifurcation diagram verification for the diblock copolymer model.” Applied Mathematics Colloquium, New Jersey Institute of Technology, Newark, New Jersey (November 30, 2018).
17. “Combinatorial topological dynamics I: Linking combinatorial and classical dynamics.” Algebraic Topology in Data and Dynamics, Montana State University, Bozeman, Montana (July 10, 2018).
18. “Automatic differentiation, interval arithmetic, and computer-assisted proofs.” EXTREEMS Tutorial, George Mason University, Fairfax, Virginia (June 11, 2018).
19. “Bifurcation diagram verification for the diblock copolymer model.” DynamIC Seminar, Imperial College, London, England (November 21, 2017).

20. “Automatic differentiation, interval arithmetic, and computer-assisted proofs.” EXTREEMS Tutorial, George Mason University, Fairfax, Virginia (June 5-7, 2017).
21. “Rigorous continuation of equilibria and bifurcation points in the diblock copolymer equation.” BIRS Workshop on Rigorous Numerics for Infinite Dimensional Nonlinear Dynamics, Banff, Canada (May 8, 2017).
22. “Topological microstructure analysis using persistence landscapes.” Joint Mathematics Meetings, Atlanta, Georgia (January 4, 2017).
23. “Computer-assisted bifurcation diagram validation and applications in materials science.” Applied Mathematics Colloquium, University of Maryland, Baltimore County, Maryland (December 9, 2016).
24. “Topological quantification of microstructures.” CMaSC/CDS Colloquium, George Mason University, Fairfax, Virginia (November 21, 2016).
25. “Automatic differentiation, interval arithmetic, and computer-assisted proofs.” EXTREEMS Tutorial, George Mason University, Fairfax, Virginia (June 3, 2016).
26. “Rigorous level curve enclosures: From isolating blocks to bifurcation diagrams.” Winter School on Computational Mathematics, Bedlewo, Poland (lecture series, February 8, 10, and 11, 2016).
27. “Computer-assisted bifurcation diagram validation and applications in materials science.” AMS Short Course on Rigorous Numerics in Dynamics, Seattle, Washington (January 5, 2016).
28. “Computer-assisted proofs in differential equations.” GMUMS Seminar, George Mason University, Fairfax, Virginia (November 20, 2015).
29. “Rigorous validation of isolating blocks for flows.” DyToComp 2015: Dynamics, Topology, and Computations, Bedlewo, Poland (June 19, 2015).
30. “Dynamics of diblock copolymers.” EXTREEMS Faculty Talk, George Mason University, Fairfax, Virginia (May 26, 2015).
31. “Dynamics of phase separation.” DARPA Dynamics, Geometry and Big Data Sets Workshop, Arlington, Virginia (May 5, 2015).
32. “Dynamics of diblock copolymers: A case study in computer-assisted proofs.” Colloquium, Universität Augsburg, Germany (April 21, 2015).
33. “Droplet formation in binary and ternary stochastic systems.” X Americas Conference on Differential Equations and Nonlinear Analysis, Buenos Aires, Argentina (February 19, 2015).
34. “Multistability and long-term dynamics of the diblock copolymer model.” Mathematical Challenge to a New Phase of Materials Science, RIMS, Kyoto, Japan (August 8, 2014).
35. “Nucleation in three-component Cahn-Morral systems.” Sapporo Summer Conference on Dynamics of Patterns in Materials Science, Hokkaido University, Sapporo, Japan (July 31, 2014).



36. “Phase separation phenomena and partial attractor structure.” From Topological to Stochastic Techniques in Dynamical Systems, Lorentz Center, Leiden, Netherlands (June 23, 2014).
37. “Droplet formation in binary and ternary stochastic systems.” Applied Mathematics Seminar, McGill University, Montreal, Canada (April 7, 2014).
38. “Multistability in the diblock copolymer model.” RIMS Workshop on New Directions in Applied Dynamical Systems, Kyoto, Japan (March 13, 2014).
39. “Stochastic dynamics of droplet formation.” RIMS Workshop on New Directions in Applied Dynamical Systems, Kyoto, Japan (March 12, 2014).
40. “Randomized adaptive topology validation for nodal domains.” IMA Workshop on Algebraic Topology in Dynamics, Differential Equations, and Experimental Data, Minneapolis, Minnesota (February 11, 2014).
41. “Partial attractor structure — Two problems from materials science.” AIM Workshop on Rigorous Computation for Infinite Dimensional Nonlinear Dynamics, Palo Alto, California (August 29, 2013).
42. “An introduction to stochastic differential equations.” REU/URCM Seminar Series, George Mason University, Fairfax, Virginia (June 13, 2013).
43. “Droplet formation in binary and ternary stochastic systems.” IMA Special Workshop on Interactions among Localized Patterns in Dissipative Systems, Minneapolis, Minnesota (June 4, 2013).
44. “An introduction to stochastic ordinary differential equations.” IMA Tutorial on Stochastic Differential Equations, Minneapolis, Minnesota (January 11, 2013, two talks).
45. “Topology-guided sampling of complicated random patterns.” Dynamics and Patterns Seminar, University of Minnesota, Minneapolis, Minnesota (November 5, 2012).
46. “Stochastic nucleation dynamics.” IMA Dynamical Systems Seminar, Minneapolis, Minnesota (October 4, 2012).
47. “Randomized adaptive topology validation for excursion sets.” DyToComp 2012: Dynamics, Topology, and Computations, Bedlewo, Poland (June 25, 2012).
48. “Uncovering the bifurcation structure of the diblock copolymer model.” IV. Developers Workshop on the Conley-Morse Database Project, Kauai, Hawaii (March 21, 2012).
49. “Stochastic nucleation dynamics.” Spring Eastern Sectional Meeting of the American Mathematical Society, Washington, DC (March 17, 2012).
50. “Stochastic nucleation dynamics.” Oberseminar, Universität Augsburg, Germany (September 20, 2011).
51. “Topological quantification of microstructures.” Workshop on Microstructure Modeling in Drug Eluting Coatings, US Food and Drug Administration, Silver Spring, Maryland (September 6, 2011).

52. “Stochastic nucleation dynamics.” Foundations of Computational Mathematics, Budapest, Hungary (July 12, 2011).
53. “An introduction to stochastic differential equations.” URCM Seminar Series, George Mason University, Fairfax, Virginia (July 7, 2011).
54. “Probabilistic and numerical validation of homology computations for nodal domains.” Jagiellonian University, Krakow, Poland (October 21, 2010).
55. “Topology-guided sampling of Gaussian random fields.” Isaac Newton Institute, Cambridge, United Kingdom (June 25, 2010).
56. “The dynamics of nucleation in stochastic Cahn-Morral systems.” Joint SIAM/RSME-SCM-SEMA Meeting, Barcelona, Spain (May 31, 2010).
57. “Dynamics and morphology of phase separation.” SIAM-GMU Faculty Research Symposium, Fairfax, Virginia (November 6, 2009).
58. “The dynamics of nucleation in stochastic Cahn-Morral systems.” Fall Southeastern Sectional Meeting of the American Mathematical Society, Boca Raton, Florida (October 31, 2009).
59. “The dynamics of nucleation in stochastic Cahn-Morral systems.” Jagiellonian University, Krakow, Poland (October 13, 2009).
60. “Homology of complicated and random evolving patterns.” Sandia CSRI Workshop on Combinatorial Algebraic Topology, Santa Fe, New Mexico (August 29, 2009).
61. “The dynamics of nucleation in stochastic Cahn-Morral systems.” International Conference on Random Dynamical Systems, Chern Institute of Mathematics, Tianjin, China (June 8, 2009).
62. “Counting holes in microstructures: Topology and materials.” REU & URCM Research Seminar Series, George Mason University, Fairfax, Virginia (June 3, 2009).
63. “Topology-guided sampling of Gaussian random fields.” Workshop on Topology, Institute for Advanced Study, Princeton, New Jersey (April 1, 2009).
64. “Spinodal decomposition: Complex patterns and topology.” Soft Matter Laboratory, Yale University, New Haven, Connecticut (February 24, 2009).
65. “Determining the topology of random evolving patterns from discretizations.” LCDS Seminar, Brown University, Providence, Rhode Island (February 23, 2009).
66. “Homology computations for random nodal domains.” Annual Meeting of the American Mathematical Society, Washington, DC (January 6, 2009).
67. “Homology computations for random nodal domains.” Applied Mathematics Seminar, George Washington University, Washington, DC (November 18, 2008).
68. “Verified homology computations for nodal domains.” Computational Topology and Dynamics Workshop, Bozeman, Montana (August 12, 2008).
69. “Topology-guided sampling of complicated random patterns.” Foundations of Computational Mathematics, Hong Kong, China (June 16, 2008).

70. “Topology-guided sampling of complicated random patterns.” Rocky Mountain Conference on Dynamical Systems, Park City, Utah (May 16, 2008).
71. “Topology-guided sampling of complicated random patterns.” Oberseminar, Universität Augsburg, Germany (April 14, 2008).
72. “Counting holes in microstructures: Topology and materials.” Osher Lifelong Learning Institute, Fairfax, Virginia (April 1, 2008).
73. “Homological analysis of complicated random patterns.” Applied Dynamics Seminar, University of Maryland, College Park, Maryland (February 14, 2008).
74. “Topological quantification of complex microstructures.” US Food and Drug Administration, Silver Spring, Maryland (January 31, 2008).
75. “Homological analysis of complicated random patterns.” Mathematics Colloquium, Virginia Tech, Blacksburg, Virginia (November 30, 2007).
76. “Homological analysis of complicated random patterns.” CSUMS Lecture, College of William and Mary, Williamsburg, Virginia (November 12, 2007).
77. “Counting holes in microstructures: Topology and materials.” Science Showcase for High End High School Students, Fairfax, Virginia (October 19, 2007).
78. “Homological analysis of complicated random patterns.” GMU Applied and Computational Mathematics Seminar, Fairfax, Virginia (October 12, 2007).
79. “Uncertainty quantification for homology computations.” ICIAM 07: 6th International Congress on Industrial and Applied Mathematics, Zürich, Switzerland (July 20, 2007).
80. “Der Cahn-Hilliard Attraktor in zwei Raumdimensionen.” Oberseminar, Universität Augsburg, Germany (July 12, 2007).
81. “Determining the topology of complex stochastic patterns from finite discretizations.” SIAM Conference on Applications of Dynamical Systems, Snowbird, Utah (May 30, 2007).
82. “Homological characterization of patterns.” Computational Homology and Fluid Dynamics Workshop, Atlanta, Georgia (March 1, 2007).
83. “Structure of the attractor of the Cahn-Hilliard equation on a square.” Seminar, Kyoto University, Kyoto, Japan (February 12, 2007).
84. “Homological analysis of complex transient patterns via discretizations.” Workshop on Topological and Computational Approaches to Dynamical Systems and Applications, Kyoto, Japan (February 9, 2007).
85. “Complex transient patterns and their topology.” Winter Meeting of the Canadian Mathematical Society, Toronto, Canada (December 11, 2006).
86. “Probabilistic and numerical validation of homology computations for nodal domains.” Dynamics and Control Seminar, Rutgers University, Piscataway, New Jersey (October 24, 2006).
87. “Probabilistic and numerical validation of homology computations for nodal domains.” Workshop on Application of Topology in Science and Engineering, MSRI, Berkeley, California (September 18, 2006).

88. “Zur Homologie von Knotengebieten zufälliger Fourierreihen.” Universität Augsburg, Germany (June 19, 2006).
89. “On the accuracy of homology computations for nodal domains.” DyToComp 2006: Dynamics, Topology, and Computations, Bedlewo, Poland (June 6, 2006).
90. “Topological quantification of complex microstructures.” Day of Computational Mathematics, Nowy Sacz, Poland (June 2, 2006).
91. “Computational homology and the evolution of complex patterns.” Graduate Seminar, George Mason University, Fairfax, Virginia (April 26, 2006).
92. “Complex transient patterns and their homology.” Duke University, Durham, North Carolina (April 3, 2006).
93. “Computational homology and the evolution of complex patterns.” College of William and Mary, Williamsburg, Virginia (March 24, 2006).
94. “Computational homology and the evolution of complex patterns.” Applied Mathematics Colloquium, New Jersey Institute of Technology, Newark, New Jersey (February 24, 2006).
95. “Homological characterization of patterns in phase separation.” Workshop on Computational Homology and Materials Science, Atlanta, Georgia (February 4, 2006).
96. “Computational homology tutorial: Accuracy of homology computations.” Workshop on Computational Homology and Materials Science, Atlanta, Georgia (February 2, 2006).
97. “On the accuracy of homology computations for nodal domains.” Georgia Institute of Technology, Atlanta, Georgia (December 1, 2005).
98. “Computational approaches to phase separation dynamics.” Third Pacific Rim Conference on Mathematics, Fudan University, Shanghai, China (August 18, 2005).
99. “Evolution of complex transient patterns.” Mini-Symposium on Nonlinear Analysis and Applications, Augsburg, Germany (June 24, 2005).
100. “The effects of noise on transient pattern formation.” SIAM Conference on Applications of Dynamical Systems, Snowbird, Utah (May 26, 2005).
101. “Residual stress networks in polycrystalline materials: Their origin and character.” SIAM Conference on Applications of Dynamical Systems, Snowbird, Utah (May 23, 2005).
102. “Long-term dynamics of the Cahn-Hilliard equation.” University of Maryland, Baltimore County, Maryland (May 2, 2005).
103. “Algebraic topology and the evolution of complex patterns.” University of Maryland, Baltimore County, Maryland (April 15, 2005).
104. Lecture series at the summer school on “Conley-Index and Computational Homology.” Pappenheim, Germany (September 19–24, 2004).

105. “Stochastic Cahn-Hilliard dynamics.” Fifth International Conference on Dynamical Systems and Differential Equations, Pomona, California (June 16, 2004).
106. “A probabilistic approach to transient pattern formation.” SIAM Conference on Mathematical Aspects of Materials Science, Los Angeles, California (May 26, 2004).
107. “Evolution of pattern complexity in Cahn-Hilliard models.” SIAM Conference on Mathematical Aspects of Materials Science, Los Angeles, California (May 25, 2004).
108. “Higher-dimensional Cahn-Hilliard-Cook dynamics.” Georgia Institute of Technology, Atlanta, Georgia (April 19, 2004).
109. “Cahn-Hilliard dynamics in higher dimensions.” Hokkaido University, Sapporo, Japan (March 18, 2004).
110. “Stochastic Cahn-Hilliard dynamics.” US-Japan Workshop on Dynamics and Computation, Shonan, Japan (March 9, 2004).
111. “Stochastic Cahn-Hilliard dynamics.” University of Maryland, College Park, Maryland (February 26, 2004).
112. “Pattern formation in Cahn-Hilliard-type models.” NIST, Gaithersburg, Maryland (February 17, 2004).
113. “Random sums and transient pattern formation.” Michigan State University, East Lansing, Michigan (January 13, 2004).
114. “Pattern formation in Cahn-Hilliard-type models.” Laboratory for Computer Design of Materials, George Mason University, Fairfax, Virginia (October 6, 2003).
115. “Transient pattern formation in the Cahn-Hilliard-Cook model.” NSF-CBMS Conference on Stochastic Partial Differential Equations and their Applications, Chicago, Illinois (May 22, 2003).
116. “Random sums and transient pattern formation.” Georgia Institute of Technology, Atlanta, Georgia (March 27, 2003).
117. “Polarization mode dispersion, decorrelation, and diffusion in optical fibers with randomly varying elliptical birefringence.” Optical Fiber Communication Conference 2003, Atlanta, Georgia (March 26, 2003).
118. “Random sums and transient pattern formation.” Universität Augsburg, Germany (June 25, 2002).
119. “Random sums and transient pattern formation.” RWTH Aachen, Germany (June 18, 2002).
120. “Stochastic phenomena in pattern formation mechanisms.” George Mason University, Fairfax, Virginia (March 19, 2002).
121. “Transient pattern formation in parabolic problems.” Georgetown University, Washington, DC (October 12, 2001).
122. “Pattern formation in metal alloys.” Physics Department, University of Maryland, Baltimore County, Baltimore, Maryland (April 4, 2001).

123. "Transient pattern formation in metal alloys." Ohio State University, Columbus, Ohio (November 30, 2000).
124. "Transient pattern formation in the Cahn-Hilliard model." University of Maryland, College Park, Maryland (May 15, 2000).
125. "Spinodal decomposition for the Cahn-Hilliard model." EquaDiff 99, Berlin, Germany (August 2, 1999).
126. "Introduction to random dynamical systems." George Mason University, Fairfax, Virginia (November 20, 1998).
127. "Pattern formation in metal alloys." SUNY at Buffalo, Buffalo, New York (November 12, 1998).
128. "Spinodal decomposition for multi-component Cahn-Hilliard systems." Third Americas Conference on Differential Equations and Nonlinear Analysis, Atlanta, Georgia (September 12, 1998).
129. "Pattern formation in higher-order parabolic differential equations." UMBC, Baltimore, Maryland (March 6, 1998).
130. "Spinodal decomposition for the Cahn-Hilliard equation in higher dimensions." Workshop on interfaces and parabolic regularisation, Leiden University, Netherlands, (November 6, 1997).
131. "Spinodal decomposition for the Cahn-Hilliard equation in higher dimensions." AMS 1997 Fall Central Sectional Meeting, Milwaukee, Wisconsin (October 25, 1997).
132. "Slow motion in higher-order systems and  $\Gamma$ -convergence in one space dimension." AMS 1997 Fall Southeastern Sectional Meeting, Atlanta, Georgia (October 18, 1997).
133. "Spinodal decomposition for the Cahn-Hilliard equation." Georgia Institute of Technology, Atlanta, Georgia (October 9, 1997).
134. "Slow motion in higher-order systems and  $\Gamma$ -convergence in one space dimension." Large time behavior in dynamical systems: Analysis and numerics, Oberwolfach, Germany (August 1, 1997).
135. "Slow motion in higher-order parabolic equations." Third European conference on elliptic and parabolic problems, Pont-a-Mousson, France (June 16, 1997).
136. "Slow motion and pattern formation in higher-order parabolic equations." University of Utah, Salt Lake City, Utah (February 7, 1997).
137. "Slow motion and pattern formation in higher-order parabolic equations." Brigham Young University, Provo, Utah (February 6, 1997).
138. "Pattern formation in the Cahn-Hilliard equation." Clemson University, Clemson, South Carolina (May 30, 1996).
139. "Slow motion in higher-order singularly perturbed equations." Center for Applied Mathematics, Cornell University, Ithaca, New York (May 17, 1996).
140. "Construction of doubly periodic solutions of nonlinear planar elliptic equations with certain nodal domains" (poster session). Callaway Gardens, Pine Mountain, Georgia (March 10, 1996).

141. “Introduction to random dynamical systems.” Georgia Institute of Technology, Atlanta, Georgia (lecture series, November 14, 21, and 28, 1995, January 23 and 30, 1996).
142. “Linearization of random dynamical systems.” Georgia Institute of Technology, Atlanta, Georgia (November 16, 1995).
143. “Stationary solutions of the Cahn-Hilliard equation in two dimensions.” Georgia Institute of Technology, Atlanta, Georgia (September 28, 1995).
144. “Qualitative behavior of random differential equations.” Fifth international colloquium on differential equations, University of Plovdiv, Bulgaria (August 20, 1994).
145. “Linearization of random dynamical systems.” Universität München, Germany (July 25, 1994).
146. “Linearization of random dynamical systems — an approach via nonautonomous random difference equations.” First international conference on difference equations, Trinity University – San Antonio, Texas (May 26, 1994).
147. “A generalized Hartman-Grobman theorem for random dynamical systems.” Workshop “A day full of randomness,” Universität Bremen, Germany (June 4, 1993).
148. “A Hartman-Grobman theorem for discrete random dynamical systems.” Universität Bremen, Germany (January 7, 1993).
149. “Matroid extensions.” Fourth international symposium on graph theory and combinatorics, CIRM – Marseille Luminy, France (July 12, 1990).
150. “Supersolvable matroid extensions.” RISC-workshop on combinatorics and computational algebraic geometry, RISC – Linz, Austria (May 25, 1989).

### University and Community Service:

George Mason University:

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|-----------|---|
| 2024-2025 | College of Science Promotion and Tenure Committee               |
| 2023-2024 | College of Science Promotion and Tenure Committee, Secretary    |
| 2023      | Ph.D. Candidacy Exam Committee (Alonso Ogueda-Oliva)            |
| 2023      | Ph.D. Candidacy Exam Committee (Jessica Masterson)              |
| 2023      | Ph.D. Candidacy Exam Committee (Biniyam Tibebu)                 |
| 2023      | Graduate Student Faculty Mentor (Kelsi Listman)                 |
| 2023      | Peer Reviewer for Teaching (G. De La Pena)                      |
| 2022-2023 | College of Science Promotion and Tenure Committee, Co-Secretary |
| 2022      | M.S. Committee (Wafaa Mahzari)                                  |
| 2022      | Ph.D. Thesis Defense Committee, Chair (Peter Rizzi)             |
| 2022      | Ph.D. Thesis Defense Committee (Deanna Easley)                  |
| 2022      | Ph.D. Candidacy Exam Committee (Patrick Bishop)                 |
| 2022      | Peer Reviewer for Teaching (S. Bruschi, D. Eckley)              |

- 2021 Ph.D. Candidacy Exam Committee, Chair (Justin Thorpe)
- 2021 Graduate Student Faculty Mentor (Sameer Savkar)
- 2021 Graduate Student Faculty Mentor (Jackson Williams)
- 2021 Ph.D. Thesis Defense Committee, External Reviewer,  
Universidad Complutense de Madrid, Spain (Pedro Chocano)
- 2021 M.S. Committee, Chair (Lauren Joyave)
- 2021 Ph.D. Candidacy Exam Committee, Chair (Peter Rizzi)
- 2020 Ph.D. Thesis Defense Committee (Sayomi Kamimoto)
- 2020 Ph.D. Candidacy Exam Committee (Deanna Easley)
- 2020 Ph.D. Thesis Defense Committee (Ryan Vaughn)
- 2020 Ph.D. Candidacy Exam Committee, Chair (Justin Thorpe)
- 2020 Ph.D. Thesis Defense Committee, External Member,  
University of Sherbrooke, Canada (Reza Ghamarshoushtari)
- 2019 Ph.D. Thesis Examination Committee, External Member,  
University of Sherbrooke, Canada (Reza Ghamarshoushtari)
- 2019 Ph.D. Candidacy Exam Committee (Sayomi Kamimoto)
- 2019 Peer Reviewer for Teaching (K. Nong)
- 2018 Ph.D. Candidacy Exam Committee (Ryan Vaughn)
- 2017 Ph.D. Thesis Defense Committee (Diego Torrejon)
- 2017 Ph.D. Candidacy Exam Committee (Ryan Vaughn)
- 2017 Ph.D. Thesis Defense Committee, Chair (Patrick O'Neil)
- 2017 M.S. Committee (Stephanie Mui)
- 2017 Peer Reviewer for Teaching (H. Antil, S. Lawton)
- 2016 Ph.D. Candidacy Exam Committee (Diego Torrejon)
- 2016 Ph.D. Thesis Defense Committee (Hasitha de Silva)
- 2016 Ph.D. Candidacy Exam Committee, Chair (Patrick O'Neil)
- 2016 Peer Reviewer for Teaching (G. Agnarsson, H. Lamba)
- 2016 Ph.D. Thesis Defense Committee, Chair (Thomas Stephens)
- 2016 M.S. Committee (Zach Pryor)
- 2014-2016 Departmental Policy & Hiring Committee
- 2015 Ph.D. Thesis Defense Committee (Jonathan Lisic)
- 2015 Peer Reviewer for Teaching (G. Agnarsson, H. Antil)
- 2015 Peer Reviewer for Teaching (S. Schluchter, G. De La Pena,  
H. Razafinjatovo, D. Eckley, M. Holzer)
- 2015 Ph.D. Candidacy Exam Committee, Chair (Patrick O'Neil)
- 2015 Ph.D. Candidacy Exam Committee (Hasitha de Silva)
- 2015 Ph.D. Candidacy Exam Committee (Diego Torrejon)
- 2015 Ph.D. Candidacy Exam Committee, Chair (Thomas Stephens)
- 2015 Ph.D. Candidacy Exam Committee (Jonathan Lisic)
- 2012-2014 Departmental IT Manager
- 2014 Peer Reviewer for Teaching (J. Boyette, G. Bulancea)
- 2014 Ph.D. Candidacy Exam Committee (Alathea Jensen)



- 2014 Ph.D. Candidacy Exam Committee, Chair (Thomas Stephens)
- 2014 Ph.D. Thesis Defense Committee (Pin Ren)
- 2014 M.S. Committee (Ericson Davis)
- 2013 Undergraduate Honors Thesis Committee (Andy Zeng)
- 2013 Ph.D. Candidacy Exam Committee (Hasitha de Silva)
- 2013 Ph.D. Thesis Defense Committee (Maziar Raissi)
- 2013 Peer Reviewer for Teaching (E. Addo, A. Goetz, C. Sausville)
- 2013 Ph.D. Thesis Defense Committee (Tyrus Berry)
- 2013 Ph.D. Candidacy Exam Committee (Maziar Raissi)
- 2013 Ph.D. Candidacy Exam Committee (Pin Ren)
- 2012 Ph.D. Candidacy Exam Committee (Jonathan Lisic)
- 2011 Departmental Representative, COS Director of Technologies Hiring Committee
- 2011 Ph.D. Thesis Defense Committee, Chair (Scott Cochran)
- 2011 M.S. Committee, Chair (Mike Atkins)
- 2011 Ph.D. Candidacy Exam Committee (Tyrus Berry)
- 2010-2011 Director of the GMU Math URCM Program
- 2008-2011 Ph.D. Candidacy Exam Committee (Robert Reznik)
- 2010 Ph.D. Thesis Defense Committee (Richard Tatum)
- 2010 Ph.D. Candidacy Exam Committee, Chair (Scott Cochran)
- 2008-2010 Departmental Policy & Hiring Committee
- 2007-2010 College of Science Promotion and Tenure Committee
- 2009 Ph.D. Thesis Defense Committee (Javed Siddique)
- 2009 Ph.D. Thesis Defense Committee, Co-Chair (Andrew Corrigan)
- 2009 M.S. Committee (Terrance Flynn)
- 2008 Departmental Endowed Professor Hiring Committee, Chair
- 2008 M.S. Committee, Chair (Elan Rodan)
- 2008 Ph.D. Candidacy Exam Committee (Richard Tatum)
- 2008 Ph.D. Candidacy Exam Committee, Co-Chair (Andrew Corrigan)
- 2008 Ph.D. Thesis Defense Committee, Chair (Tina Hartley)
- 2006-2008 Departmental Graduate Committee
- 2007 M.S. Committee (Mary Ann Graham)
- 2007 Ph.D. Candidacy Exam Committee, Chair (Tina Hartley)
- 2007 Ph.D. Candidacy Exam Committee (Javed Siddique)
- 2005-2007 Departmental Colloquium Committee
- 2006 Ph.D. Thesis Defense Committee (Timothy Seaman)
- 2006 Preliminary Exam Committee (Linear Analysis, ODE)
- 2006 Honors Thesis Committee (Tyler White)
- 2003-2006 Departmental SCS Liaison
- 2005 Ph.D. Candidacy Exam Committee (Timothy Seaman)
- 2005 Departmental Postdoc Hiring Committee
- 2005 Departmental Hiring Committee
- 2003 M.S. Committee (Karen Crossin)

2003 Undergraduate Grade Appeal Committee

University of Maryland, Baltimore County:

2005 Ph.D. Thesis Defense Committee (Valeriy Korostyshevskiy)  
2004 M.S. Thesis Defense Committee, Chair (Jonathan Desi)  
2003 Ph.D. Qualifying Exam Committee (Valeriy Korostyshevskiy)  
2002 Ph.D. Thesis Defense Committee (Devasis Bassu)  
2002 M.S. Thesis Defense Committee, Chair (Jennifer Deering)  
2001-2002 Applied Mathematics Colloquium Organizer  
2001-2002 Departmental Hiring Committee (Applied Mathematics)  
2001 Ph.D. Qualifying Exam Committee (Justin Nave)  
1998-2001 Departmental Graduate Program Committee  
2001 Ph.D. Thesis Defense Committee (Igor Shimansky)  
2001 Differential Equations Seminar Organizer  
2000-2001 Departmental Library Liaison  
1999-2000 Hiring Committee (Department Chair)  
1999-2000 Departmental Hiring Committee (Scientific Computing)  
1999 Ph.D. Qualifying Exam Committee (Devasis Bassu)  
1999 M.S. Thesis Defense Committee (Yoon Song)  
1998-1999 Classroom Instructional Technology Committee