Curriculum Vitae — Juan G. Restrepo

Contact Information

Address: 526 Applied Mathematics, UCB, Boulder, CO 80309-0526, USA
Phone: +1(303)-735-5640
Fax: +1(303)-492-4066
Email: juanga@colorado.edu
Webpage: `https://www.colorado.edu/amath/restrepo`

Professional Appointments

- August 2016 - Present: Associate Professor, Applied Mathematics Department, University of Colorado, Boulder, Colorado, USA.
- August 2008 - July 2016: Assistant Professor, Applied Mathematics Department, University of Colorado, Boulder, Colorado, USA.
- August 2006 - June 2008: Postdoctoral Researcher, Physics Department, Northeastern University, Boston, Massachusetts, USA.
- June 2005 - June 2006: Postdoctoral Researcher, Institute for Research in Electronics and Applied Physics, University of Maryland, College Park, Maryland, USA.
- January 2002 - May 2005: Graduate Research Assistant, Institute for Research in Electronics and Applied Physics, University of Maryland, College Park, Maryland, USA.

Research Interests

- Dynamics on and structure of complex networks.
- Synchronization.
- Nonlinear dynamics and chaos.
- Spread of information and disease in complex social networks.
- Criticality in functional brain networks.

Education

- Ph.D., Applied Mathematics, University of Maryland, College Park, May 2005. Advisors: Edward Ott, Brian R. Hunt.
- M.S., Mathematics, Universidad de los Andes, Colombia, May 2002. Advisor: Sergio Fajardo.
- B.S., Physics, Universidad de los Andes, Colombia, March 1999. Advisors: Victor Tapia, Rolando Roldán.

Ph.D. and M.S. Students

The current position of graduated Ph.D. students is included.

- Sabina Adhikari, Ph.D., expected May 2024.
- Corbit Sampson, Ph.D., expected May 2024.
- Rebecca Cohen, M.S., completed May 2023.
- Nicholas Landry, Ph.D., completed May 2022. Currently a postdoctoral researcher at the University of Vermont.

- Yogesh Virkar, Ph.D., completed May 2017. Currently employed at Amazon Web Services.
- Warren Lord, M.S., completed May 2014.
- Dane R. Taylor, Ph.D., completed May 2013. Currently an Assistant Professor at SUNY Buffalo Mathematics Department.
- Per Sebastian Skardal, Ph.D., completed May 2013. Currently an Associate Professor at Trinity College Mathematics Department.
- Marshall Y. Carpenter, M.S., completed May 2012.
- Daniel B. Larremore, Ph.D., completed May 2012. Currently an Assistant Professor at CU Boulder Computer Science Department.

Publications

Publications in Peer-Reviewed Journals

1. Zhong-Ke Gao, Dibakar Ghosh, Heather A. Harrington, **Juan G. Restrepo**, and Dane Taylor, Dynamics on networks with higher-order interactions, Chaos 33, 040401 (2023).

2. Sabina Adhikari, **Juan G. Restrepo**, and Per Sebastian Skardal, Synchronization of phase oscillators on complex hypergraphs, Chaos 33, 033116 (2023).

3. Per Sebastian Skardal, Sabina Adhikari, and **Juan G. Restrepo**, Multistability in coupled oscillator systems with higher-order interactions and community structure, Chaos 33, 023140 (2023).

4. Milad Rahimi-Majd, **Juan G. Restrepo**, and Morteza Nattagh-Najafi, Stochastic and deterministic dynamics in networks with excitable nodes, Chaos 33, 023134 (2023).

5. Nicholas W. Landry and **Juan G. Restrepo**, Hypergraph dynamics: Assortativity and the expansion eigenvalue, Chaos 32, 053113 (2022).

6. Lucille Calmon, **Juan G. Restrepo**, Jose Joaquin Torres, Ginestra Bianconi, Dirac synchronization is rhythmic and explosive, Communications Physics 5, 1-17 (2022).

7. Damien Beecroft, **Juan G. Restrepo**, David Angulo-Garcia, Greedy optimization for growing spatially embedded oscillatory networks, Phys. Rev. E 106, 034304 (2022).

8. Reza Ghorbanchian, **Juan G. Restrepo**, Joaquin J. Torres, and Ginestra Bianconi, Higher-order simplicial synchronization of coupled topological signals, Communications Physics 4 (1), 1-13 (2021).

9. Nicholas Landry and **Juan G. Restrepo**, Effect of heterogeneity on hypergraph contagion models, Chaos 30, 103117 (2020).

10. Perrin Ruth and **Juan G. Restrepo**, Dodge and survive: modeling the predatory nature of dodgeball, Phys. Rev. E 102(6), 062302 (2020) [8 pages].

11. Kathleen Finlinson, Woodrow L. Shew, Daniel B. Larremore, **Juan G. Restrepo**, Optimal control of excitable systems near criticality, Physical Review Research 2 (3), 033450 (2020).

12. Kristopher Tucker, Diego Barberena, Robert J. Lewis-Swan, James K. Thompson, **Juan G. Restrepo**, Ana M. Rey, Facilitating spin squeezing generated by collective dynamics with single-particle decoherence, Physical Review A 102 (5), 051701 (2020).

13. Yogesh S. Virkar, **Juan G. Restrepo**, Woodrow L. Shew, and Ed Ott, Dynamic regulation of resource transport induces criticality in multilayer networks of excitable units, Physical Review E 101 (2), 022303 (2020).

14. Amitava Banerjee, Jaideep Pathak, Rajarshi Roy, **Juan G. Restrepo**, and Edward Ott, Using machine learning to assess short term causal dependence and infer network links, Chaos 29, 121104 (2019).

15. **Juan G. Restrepo**, Per Sebastian Skardal, Competitive suppression of synchronization and nonmonotonic transitions in oscillator communities with distributed time delay, Physical Review Research 1, 033042 (2019).

16. Kris Tucker, Bihui Zhu, Robert J. Lewis-Swan, Jamir Marino, Felix Jimenez, **Juan G. Restrepo**, and Ana Maria Rey, Shattered Time: Can a Dissipative Time Crystal Survive Many-Body Correlations?, New Journal of Physics, 20 123003 (2018). [6 pages]

17. Vidit Agrawal, Andrew B. Cowley, Qusay Alfaori, Daniel B. Larremore, **Juan G. Restrepo**, and Woodrow L. Shew, Robust entropy requires strong and balanced excitatory and inhibitory synapses, Chaos 28, 103115 (2018). [8 pages]

18. Dane Taylor, **Juan G. Restrepo**, Francois Meyer, Ensemble-based estimates of eigenvector error for empirical covariance matrices, Information and Inference: A Journal of the IMA, 00, 1-24 (2018). [24 pages]

19. Per Sebastian Skardal, **Juan G Restrepo**, Edward Ott, Uncovering low dimensional macroscopic chaotic dynamics of large finite size complex systems, Chaos, 27 (8), 083121 (2017) [6 pages].

20. Prasanna Madhusudhanan, **Juan G. Restrepo**, Youjian (Eugene) Liu, and Timothy X. Brown, Analysis of Downlink Connectivity Models in a Heterogeneous Cellular Network via Stochastic Geometry, IEEE Transactions on Wireless Communications, 15(6):3895-3907 (2016) [13 pages].

21. Yogesh S. Virkar, Woodrow L. Shew, **Juan G. Restrepo**, and Edward Ott, Feedback control stabilization of critical dynamics via resource transport on multilayer networks: How glia enable learning dynamics in the brain, Phys. Rev. E 94(4), 042310 (2016) [8 pages].

22. Yogesh S. Virkar, **Juan G. Restrepo**, and James D. Meiss, Hamiltonian mean field model: Effect of network structure on synchronization dynamics, Phys. Rev. E 92, 052802 (2015) [14 pages].

23. Bihui Zhu, Johannes Schachenmayer, Minghui Xu, **Juan G. Restrepo**, Murray J. Holland, and Ana Maria Rey, Synchronization of Interacting Quantum Dipoles, New Journal of Physics 17, 083063 [8 pages] (2015).

24. Per Sebastian Skardal, **Juan G. Restrepo**, and Edward Ott, Frequency assortativity can induce chaos in oscillator networks, Phys. Rev. E 91, 060902(R) [5 pages] (2015).

25. Per Sebastian Skardal and **Juan G. Restrepo**, Coexisting chaotic and multi-periodic dynamics in a model of cardiac alternans, Chaos 24, 043126 [8 pages] (2014).

26. Prasanna Madhusudhanan, **Juan G. Restrepo**, Youjian (Eugene) Liu, Timothy X. Brown, and Kenneth Baker, Downlink Performance Analysis for a Generalized Shotgun Cellular System, IEEE Transactions on Wireless Communications 13, 6684 [13 pages] (2014).

27. **Juan G. Restrepo** and Edward Ott, Mean field theory of assortative networks of phase oscillators, Europhys. Lett. 107, 60006 [6 pages] (2014).

28. Per Sebastian Skardal, Alain Karma, **Juan G. Restrepo**, Spatiotemporal Dynamics of Calcium-Driven Cardiac Alternans, Phys. Rev. E 89, 052707 [24 pages] (2014).

29. **Juan G. Restrepo**, James D. Meiss, Onset of Synchronization in the Disordered Hamiltonian Mean Field Model, Phys. Rev. E 89, 052125 [5 pages] (2014).

30. Daniel B. Larremore, Woodrow L. Shew, Edward Ott, Francesco Sorrentino, **Juan G. Restrepo**, Inhibition guarantees ceaseless cortex network dynamics, Physical Review Letters 112, 138103 [5 pages] (2014).

31. Per Sebastian Skardal, Dane Taylor, **Juan G. Restrepo**, Complex macroscopic behavior in systems of phase oscillators with adaptive coupling, Physica D 267, 27 [9 pages] (2014).

32. Dane Taylor, Elana J. Fertig, and **Juan G. Restrepo**, Dynamics in hybrid complex systems of switches and oscillators, Chaos 23, 033142 [12 pages] (2013).

33. Per Sebastian Skardal, Jie Sun, Dane Taylor, and **Juan G. Restrepo**, Effects of Degree-frequency Correlations on Network Synchronization: Universality and Full Phase-locking, Europhys. Lett. 101, 20001 [6 pages] (2013).

34. Prasanna Madhusudhanan, **Juan G. Restrepo**, Youjian (Eugene) Liu, Timothy X. Brown, Kenneth R. Baker, Stochastic Ordering based Carrier-to-Interference Ratio Analysis for the Shotgun Cellular Systems, IEEE Wireless Communications Letters 1(6), 565 [4 pages] (2012).

35. Daniel B. Larremore, Marshall Y. Carpenter, Edward Ott, and **Juan G. Restrepo**, Statistical Properties of Avalanches in Networks, Phys. Rev. E 85, 066131 [11 pages] (2012).

36. Dane Taylor, **Juan G. Restrepo**, Network-specific approach to percolation in networks with bidirectional links, Europhysics Letters 98, 16007 [6 pages] (2012).

37. Per Sebastian Skardal, Alain Karma, **Juan G. Restrepo**, Unidirectional Pinning and Hysteresis of Spatially Discordant Alternans in Cardiac Tissue, Physical Review Letters 108, 108103 [5 pages] (2012).

38. Per Sebastian Skardal, **Juan G. Restrepo**, Hierarchical Synchrony of Phase Oscillators in Modular Networks, Phys. Rev. E 85, 016208 [8 pages] (2012).

39. Per Sebastian Skardal, Edward Ott, **Juan G. Restrepo**, Cluster Synchrony in Systems of Coupled Phase Oscillators with Higher-Order Coupling, Phys. Rev. E 84, 036208 [10 pages] (2011).

40. Wai Shing Lee, **Juan G. Restrepo**, Edward Ott, Thomas M. Antonsen, Dynamics and Pattern Formation in Large Systems of Spatially-Coupled Oscillators with Finite Response Times, Chaos 21, 023122 [14 pages] (2011).

41. Dane Taylor, **Juan G. Restrepo**, Network connectivity during mergers and growth: Optimizing the addition of a module, Phys. Rev. E 83, 066112 [7 pages] (2011).

42. Daniel B. Larremore, Woodrow L. Shew, Edward Ott, and **Juan G. Restrepo**, Effects of network topology, transmission delays, and refractoriness on the response of coupled excitable systems to a stochastic stimulus, Chaos 21, 025117 [10 pages] (2011).

43. Daniel B. Larremore, Woodrow L. Shew, **Juan G. Restrepo**, Predicting criticality and dynamic range in complex networks: effects of topology, Physical Review Letters 106, 058101 [4 pages] (2011).

44. Dane Taylor, Edward Ott, and **Juan G. Restrepo**, Spontaneous synchronization of coupled oscillator systems with frequency adaptation, Phys. Rev. E 81, 046214 [8 pages] (2010).

45. **Juan G. Restrepo** and Alain Karma, Spatiotemporal intracellular calcium dynamics during cardiac alternans, Chaos **19**, 037115 [15 pages] (2009).

46. **Juan G. Restrepo** and Alain Karma, Line-defect patterns of unstable spiral waves in cardiac tissue, Physical Review E **79**, 030906(R) [4 pages] (2009).

47. **Juan G. Restrepo**, James N. Weiss, and Alain Karma, Calsequestrin Mediated Mechanism for Cellular Calcium Transient Alternans, Biophysical Journal **85**, 3767 [23 pages] (2008).

48. Aman Mahajan, Yohannes Shiferaw, Daisuke Sato, Ali Baher, Riccardo Olcese, Lai-Hua Xie, Ming-Jim Yang, Peng-Shen Chen, **Juan G. Restrepo**, Alain Karma, Alan Garfinkel, Zhilin Qu, and James N. Weiss, A rabbit ventricular action potential model replicating cardiac dynamics at rapid heart rates, Biophysical Journal **94**, 392 [19 pages] (2008).

49. **Juan G. Restrepo**, Edward Ott, and Brian R. Hunt, Weighted percolation on directed networks, Physical Review Letters **100**, 058701 [4 pages] (2008).

50. **Juan G. Restrepo**, Edward Ott, and Brian R. Hunt, Approximating the largest eigenvalue of network adjacency matrices, Physical Review E **76**, 056119 [6 pages] (2007).

51. **Juan G. Restrepo**, Edward Ott, and Brian R. Hunt, Emergence of synchronization in complex networks of interacting dynamical systems, Physica D **224**, 114 [9 pages] (2006).

52. **Juan G. Restrepo**, Edward Ott, and Brian R. Hunt, Characterizing the dynamical importance of network nodes and links, Physical Review Letters **97**, 094102 [4 pages] (2006).

53. **Juan G. Restrepo**, Brian R. Hunt, and Edward Ott, Scaling of branching in arterial and bronchial trees, Physical Review Letters **96**, 128101 [4 pages] (2006).

54. **Juan G. Restrepo**, Edward Ott, and Brian R. Hunt, Emergence of coherence in complex networks of heterogeneous dynamical systems, Physical Review Letters **96**, 254103 [4 pages] (2006).

55. **Juan G. Restrepo**, Edward Ott, and Brian R. Hunt, Synchronization in large directed networks of coupled phase oscillators, Chaos **16**, 015107 [10 pages] (2006).

56. **Juan G. Restrepo**, Edward Ott, and Brian R. Hunt, Onset of synchronization in large networks of coupled oscillators, Physical Review E **71**, 036151 [12 pages] (2005).

57. **Juan G. Restrepo**, Edward Ott, and Brian R. Hunt, Desynchronization waves and localized instabilities in oscillator arrays, Physical Review Letters **93**, 114101 [4 pages] (2004).

58. **Juan G. Restrepo**, Edward Ott, and Brian R. Hunt, Spatial patterns of desynchronization bursts in networks, Physical Review E **69**, 066215 [11 pages] (2004).

Book Chapters

1. Daniel B. Larremore, Woodrow L. Shew, and **Juan G. Restrepo**, Critical Dynamics in Complex Networks, book chapter in "Criticality in Neural Systems" published by John Wiley & Sons, edited by Dietmar Pleanz and Ernst Niebur [27 pages] (2014).

2. Ana Paula Millan, **Juan G. Restrepo**, Jose Joaquin Torres, and Ginestra Bianconi, Geometry, Topology and Simplicial Synchronization. In: Battiston, F., Petri, G. (eds) Higher-Order Systems. Understanding Complex Systems. Springer, Cham. [30 pages] (2022).

Publications in Conference Proceedings

1. Per Sebastian Skardal and **Juan G. Restrepo**. Synchronization of Kuramoto Oscillators in Networks of Networks. Proceedings of the 2012 International Symposium on Nonlinear Theory and its Applications conference proceedings. October 22 - 26, 2012, Palma, Mallorca, Spain. **(Not peer-reviewed.)**

2. Prasanna Madhusudhanan, **Juan G. Restrepo**, Youjian (Eugene) Liu, Timothy X. Brown, Downlink Coverage Analysis in a Heterogeneous Cellular Network, Proc. IEEE Global Telecommunications Conference (Globecom), Anaheim, California, USA, Dec. 2012. **(Peer-reviewed.)**

3. Prasanna Madhusudhanan, **Juan G. Restrepo**, Youjian (Eugene) Liu, and Timothy X. Brown, Multi-Tier Network Performance Analysis Using a Shotgun Cellular System, Proc. IEEE Global Telecommunications Conference (Globecom), Houston, Texas, USA, Dec. 2011. **(Peer-reviewed.)**

4. Prasanna Madhusudhanan, **Juan G. Restrepo**, Youjian (Eugene) Liu, and Timothy X. Brown, Modeling of Interference from Cooperative Cognitive Radios for Low Power Primary Users, Proc. IEEE Global Telecommunications Conference (Globecom), Miami, Florida, USA, Dec. 2010. **(Peer-reviewed.)**

5. Prasanna Madhusudhanan, **Juan G. Restrepo**, Youjian (Eugene) Liu, and Timothy X. Brown, Carrier to Interference Ratio Analysis for the Shotgun Cellular System, Proc. IEEE Global Telecommunications Conference (Globecom), Honolulu, Hawaii, USA, Nov. 2009. **(Peer-reviewed.)**

Submitted Manuscripts

1. Nicholas W. Landry, **Juan G. Restrepo**, Polarization in hypergraphs with community structure, arXiv preprint arXiv:2302.13967 (2023).

Theses

1. "Synchronization in networks of coupled oscillators", Doctoral Thesis, Applied Mathematics and Scientific Computation, University of Maryland at College Park, 2005.

2. "Representation of measures by hyperfinite games", Master Thesis, Mathematics, Universidad de los Andes, Bogotá, Colombia, 2002.

3. "The role of flat space-time in the formulation of gravitational theories", Undergraduate Thesis, Physics, Universidad de los Andes, Bogotá, Colombia, 1999.

Talks

Invited Conference and Workshop talks

- "An introduction to network analysis and modeling with applications to social contagion processes", Interdisciplinary Network Analysis Methods for Analyzing Social Systems, Providence, RI, July 2022.
- "Sincronizacion: de peatones a hipergrafos", Seminario en Nuevas Perspectivas de la Complejidad y Redes Complejas, Cartagena, Colombia, virtual, November 2021.
- "Optimal control of excitable systems near criticality.", Physical Review Journal Club, virtual, October 2021.
- "Synchronization in networks with community structure and time delays", LANET Conference 2019, Cartagena, Colombia, August 2019.
- "Uncovering low dimensional macroscopic chaotic dynamics of large finite size complex systems", Information and Self-Organizing Dynamics on Networks (ISODS) Satellite, NetSci 2019, Burlington, Vermont, May 2019.
- "Uncovering low-dimensional macroscopic chaotic dynamics of large finite size complex systems", Analysis and Modeling of Complex Oscillatory Systems Conference, Barcelona, Spain, March 2018.
- "Multilayer network regulation of critical neuronal dynamics" Complex Systems in Neuroscience Conference, University of Pittsburgh, March 2018.
- "Synchronization in Lattices of Interacting Quantum Dipoles", SIAM Conference on Applications of Dynamical Systems, Snowbird, Utah, May 2017.
- Energy Transport Workshop, University of Colorado at Boulder, December 2015.
- "Mean field theory of assortative networks of phase oscillators", Dynamics of Coupled Oscillators: 40 years of the Kuramoto Model, workshop held in the Max Planck Institute for Physics of Complex Systems, Dresden, Germany, July 2015.

- "Mean field theory for assortative networks of coupled oscillators", SIAM Conference on Applications of Dynamical Systems, Snowbird, Utah, May 2015.
- "Effect of network structure on the propagation of avalanches in networks", Information, Instability and Fragility in Networks: Methods and Applications. Workshop held in Boulder, Colorado, November 2013. (Disclaimer: I co-organized the workshop).
- "Synchronization of Kuramoto oscillators in hierarchical networks", Workshop on Coupled Networks, Patterns and Complexity, WIAS, Berlin, November 2012.
- "Criticality and dynamic range in network cascading processes", AIMS Conference on Dynamical Systems, Differential Equations, and Applications, Orlando, Florida, July 2012.
- "Statistics of Avalanches in Heterogeneous Networks", Criticality in Neural Systems Workshop, NIH, Bethesda, Maryland, April 2012.
- "Pinning and memory of period-2 dynamics in cardiac tissue", Dynamics Days, Baltimore Maryland, January 2012.
- "Criticality and Statistics of Avalanches in Network Cascading Processes", NICO Frontier Workshop, Northwestern University, December 2011.
- "Dynamic Range in Networks of Coupled Excitable Systems", SACNAS Conference, San José, California, October 2011.
- "Intermittent Synchronization in Adaptive Networks of Coupled Oscillators", SIAM Conference on Applications of Dynamical Systems, Snowbird, Utah, May 2011.
- "The dynamic range in networks of coupled excitable systems", Nonlinear Dynamics on Networks Workshop, University of Maryland, College Park, April 2010.
- "Local adaptation in oscillator networks", SIAM Conference on Applications of Dynamical Systems, Snowbird, Utah, May 2009.

Invited Colloquia

- "Sincronización: de aplicaciones a modelos matemáticos", Universidad del Norte, Mathematics Department, Barranquilla, Colombia, August 2019.
- "Multilayer network regulation of critical neuronal dynamics", University of New Mexico, Department of Mechanical Engineering, March 2017.
- "Multilayer network regulation of critical neuronal dynamics", Santa Fe Institute, March 2017.
- "Criticality and Dynamic Range in Network Cascading Processes", University of Arizona, Department of Mathematics, April 2013.
- "Criticality and Dynamic Range in Network Cascading Processes", Arkansas University, Physics Department Colloquium, February 2013.
- "Criticality and Dynamic Range in Network Cascading Processes", George Mason University, Physics Department Colloquium, February 2012.
- "Synchronization of coupled oscillators: from pedestrians to clocks", JILA Colloquium, January 2011.
- "Synchronization of oscillators with noisy frequency adaptation", University of Colorado at Colorado Springs, Mathematics Department Colloquium, November 2009.
- "Synchronization of oscillators with noisy frequency adaptation", University of Denver, Physics Department Colloquium, November 2009.

Recent Seminars and Conference Contributed Talks

- Mathematics Dept. Seminar, Queen Mary University, Nov. 2020.
- Math Bio Seminar, University of Utah, November 2018.
- Applied Dynamics Seminar, University of Maryland, September 2017.
- Applied Dynamics Seminar, University of Maryland, April 2016.
- Applied Math Seminar, Colorado State University, October 2015.
- Dynamics Days US 2015, Houston, January 2015.

Grants

Completed, Active or Awarded Grants

- 2022-2025 NSF Grant "Synchronization in Networks with Higher Order Interactions", PI. $249,981.00.
- 2022 NSF Grant "Conference: Computational Approaches for Contagion on Complex Social Systems", PI. $34,770.
- 2021-2022 NSF Grant "HNDS-I: Using Hypergraphs to Study Spreading Processes in Complex Social Networks", co-PI. $80,193.
- 2020-2021 CU Seed Grant "Organic Reservoir Computing: a Joint Theory-Experiment Study", co-PI. $50,000.
- 2017-2018, NSF, "Conference: Dynamics Days US 2018". $16,000.
- 2012-2013, ARO Proposal No. 62396-MA-CF, "Conference: Dynamics Days 2013". Sole PI. $22,440.
- 2012-2013, NSF, "Conference: Dynamics Days US 2013". $15,000.
- 2012-2013, ONR, "Conference: Dynamics Days US 2013". $19,930.
- 2009-2012, NSF Grant "Adaptation and Percolation in Complex Networks". PI. $248,054.

Teaching

Courses Developed

- Dynamics on Networks, APPM 4720, Fall 2019. New graduate/undergraduate course.
- Dynamics on Networks, APPM 7400, Fall 2011. New graduate course.

Courses Taught

- Partial Differential Equations, APPM 5470: Fall 2022 (14 students).
- Applied Probability, APPM 3570: Spring 2019 (75 students), Spring 2020 (77 students), Spring 2022 (63 students).
- Introduction to Dynamics on Networks, APPM 5720/4720-02: Fall 2022 (7 students), Fall 2019 (13 students).
- Discrete Mathematics, APPM 3170: Fall 2020 (30 students).
- Differential Equations and Linear Algebra, APPM 2360: Spring 2021 (86 students), Spring 2018 (198 students), Fall 2017 (130 students), Spring 2016 (course coordinator, 150 students) Fall 2008 (75 students), Spring 2009 (96 students), Spring 2012 (142 students).

- Matrix Methods, APPM 3310: Spring 2013 (95 students), Spring 2015 (83 students).
- Intermediate Numerical Analysis II, APPM 4660: Spring 2011 (30 students), Spring 2014 (30 students).
- Graduate Dynamics, APPM 5460: Spring 2014 (20 students).
- Mathematical Modeling, APPM 4380/5380: Fall 2010 (18 students), Fall 2011 (12 students).
- Dynamics on Networks, APPM 7400: Fall 2011 (6 students).
- Introduction to Nonlinear Dynamics and Chaos, APPM 3010: Fall 2009 (14 students), Fall 2015 (15 students), Fall 2018 (14 students), Fall 2020 (11 students - online).

Other Professional Activities

- Editor for the Journal Chaos. 2020 -
- Member of the Advisory Board for the Journal Chaos. 2013-2019.
- External reviewer for a proposal for the Austrian Science Fund in 2022 and 2023.
- External reviewer for a proposal for the German Research Foundation in 2016, 2019, and 2021.
- NSF review panel, 2022.
- NSF review panel, 2014.
- NSF review panel, 2009.
- Peer reviewed manuscripts for Physical Review Letters, SIAM Journal on Applied Mathematics, SIAM Journal on Applied Dynamical Systems, Physical Review E, Physica D, Nonlinearity, Chaos, European Physics Letters, Transactions on Network Science and Engineering, Nature Communications, SIAM Journal on Mathematics of Data Science, SIAM Journal on Multiscale Modeling & Simulation, Journal of Complex Networks, Science Advances, Physical Review Research, Frontiers in Computational Neuroscience.
- Member of the Society of Industrial and Applied Mathematics (SIAM) and the American Physical Society (APS). Fig.5

Awards

- Magna cum laude B.S. Physics degree, Universidad de los Andes, 1999.
- Best term GPA award, Universidad de los Andes, Spring 1998.
- "Andres Bello" award for the best Bogotá score in the Colombian national school leaving exam, ICFES, 1993.

Service

Campus Service

- Department's representative to the Arts and Sciences Faculty Senate, Fall 2022.
- Member of Arts and Sciences Budget Committee, Fall 2022.
- Member of the search committee for the Dean of the Natural Sciences Division of Arts and Sciences, Fall 2022-Spring 2023.

Department Service

- PUEC for Sujeet Bhat's reappointment, 2020.
- PUEC for Adrianna Gillman's tenure, 2020.
- PUEC for Zackary Kilpatrick's tenure, 2019.
- PUEC for Zackary Kilpatrick's promotion, 2017.
- PUEC for Ian Grooms' promotion, 2018.
- Graduate Committee, 2010-2011, 2013-2014, 2014-2015, 2015-2016, 2017-2018, 2018-2019, 2022.
- PDE Preliminary Exam Committee, 2010, 2011, 2014, 2016, 2017, 2019, 2020, 2022.
- Awards Committee, 2017-2018.
- Faculty Search Committee, 2014.
- Colloquium Chair, 2012-2013, 2021.
- Instructor Search Committee, 2011-2012.
- Instructor Search Committee, 2008-2009.

Conferences and mini-symposia organized

- Co-organizer of the workshop "Contagion on Complex Social Systems", Boulder, Colorado, 2022.
- Co-organizer of mini-symposium on "Dynamics on networks with higher-order interactions", SIAM Conference on Applications of Dynamical Systems, remote, 2021.
- Mini-symposium "Applications of machine learning to the analysis of nonlinear dynamical systems", 2020 JMM Meeting in Denver. Co-organizer with Maziar Raissi.
- Dynamics Days US 2018, Denver, Colorado, January 2018. Chair of the organizing committee.
- Invited session "Applications of synchronization in the micro and macro world", 2014 APS March Meeting in Denver. Co-organizer with Arkady Pikovsky.
- Information, Instability and Fragility in Networks: Methods and Applications. Workshop held in Boulder, Colorado, November 2013. Co-organizer with Michael Stutzer.
- Dynamics Days US 2013, Denver, Colorado, January 2013. Chair of the organizing committee.
- Mini-symposium on "Criticality and Dynamic Range in Neuronal Networks", SIAM Conference on Applications of Dynamical Systems, Snowbird, Utah, 2011. Co-organizer with Woodrow Shew.

Ph.D. Dissertation Committees

- Subekshya Bidari, Applied Mathematics, 2022.
- Graham Kessler O'Connor, Applied Mathematics, 2022.
- Daniel Ferguson, Applied Mathematics, 2022.
- Lindsey Wong, Applied Mathematics, 2022.
- Nicholas Landry, Applied Mathematics, 2022.
- Sabina Altus, Applied Mathematics, 2021.
- Amanda Hampton, Applied Mathematics, 2021.

- Harry Dudley, Applied Mathematics, 2020.
- Anna Broido, Applied Mathematics, 2020.
- Peiru He, Physics, 2019.
- Peter Wills, Applied Mathematics, 2018
- Bihui Zhu, Physics, 2017.
- Andrew Koller, Physics, 2017.
- Yogesh Virkar, Computer Science, 2017.
- Rebecca Mitchell, Applied Mathematics, 2017.
- Ashar Ali, Applied Mathematics, 2016.
- Joshua Weiner, Physics, 2015.
- Adam Kaufman, Physics, 2015.
- Paul V. Anderson, Aerospace Engineering, 2015.
- Nathan D. Monnig, Applied Mathematics, 2015.
- Michael Brutz, Applied Mathematics, 2014.
- Henry Romero, Applied Mathematics, 2014.
- Dustin Keck, Applied Mathematics, 2014.
- Sekson Sirisubtawee, Applied Mathematics, 2014.
- Sebastian Skardal, Applied Mathematics, 2013.
- Dane Taylor, Applied Mathematics, 2013.
- Theodore Galanthay, Applied Mathematics, 2013.
- Adam Fox, Applied Mathematics, 2013.
- Brock Mosovsky, Applied Mathematics, 2012.
- Chester P. Rubbo, Physics, 2012.
- Daniel B. Larremore, Applied Mathematics, 2012.
- Zachary Alexander, Applied Mathematics, 2012.
- Jerrad Hampton, Applied Mathematics, 2012.
- Kye Taylor, Applied Mathematics, 2011.
- Jinyu Li, Applied Mathematics, 2010.

Master's Dissertation Committees

- Jackson Curry, Applied Mathematics, 2022.
- Perrin Ruth, Applied Mathematics, 2021.
- Nikhil Krishnan, Applied Mathematics, 2019.
- Ankit Saxena, Electrical, Computer, and Energy Engineering, 2016.
- Amy Le, Applied Mathematics, 2015.
- Thomas Trantow, Applied Mathematics, 2014.
- Juan Ramirez Jr, Electrical, Computer, and Energy Engineering, 2012.
- Jason De Salvo, Applied Mathematics, 2010.
- Naveen Mysore Balasubramanya, Electrical, Computer, and Energy Engineering, 2010.
- Prasanna Madhusudhanan, Electrical, Computer, and Energy Engineering, 2010.
- Jason Boorn, Applied Mathematics, 2009.
- Pradeep Narayan, Electrical and Computer Engineering, 2008.

Miscellaneous Service

- Co-organized the CU-Boulder Applied Math Dynamics and Complex Systems Seminar, 2009-2022.
- Served on the admissions committee for the IQ-Bio program at CU Boulder.
- Served on the mentoring committee for the IQ-Bio program at CU Boulder.
- Gave presentations to high school students in the "Colorado Math Circle".