

Curriculum Vitae

Jordan Snyder

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Areas of Interest

- Phase transitions and critical phenomena on networks
- Collective phenomena and self-organization
- Dynamical systems
- Information theory

Education

- PhD. in Applied Mathematics, UC Davis. *Expected December 2018*
- M.S. in Applied Mathematics, UC Davis, *March 2016*
- B.S. in Physics and Mathematics Cum Laude, Rensselaer Polytechnic Institute, Troy, NY. *May 2013*

Employment and Experience

- Teaching Assistant, UC Davis
 - Fall 2013: MAT-17A, Calculus for Biological Sciences
 - Winter 2014: MAT-21B, Calculus
 - Spring 2014: MAT-21D, Vector Analysis
 - Fall 2015: MAT-67, Abstract Linear Algebra
 - Winter 2017: MAT-21D, Vector Analysis
 - Fall 2017: MAT-67, Abstract Linear Algebra
- Associate Instructor, UC Davis
 - Summer Session I 2014 and Summer Session II 2015: MAT-22B, Differential Equations
- Graduate Student Researcher, UC Davis, *Fall 2015 - present*
- Research Intern, Center for Nonlinear Studies at Los Alamos National Lab, *Summers 2016-2017*

Projects

- *Coarse-Graining in the Kuramoto Model*, research project at UC Davis and Los Alamos National Lab, *Summer 2017 - present*
 - Developed computational techniques for detecting low-dimensional effective behavior of a high-dimensional dynamical system, using insights from analytical calculation. Work in progress with Anatoly Zlotnik and Andrey Likhov.
- *Early Warning Signals in Mutualistic Population Dynamics*, research project at UC Davis, *Fall 2017 - present*
 - Investigated statistical signatures of correlated extinction events in a stylized model of population dynamics on empirical mutualistic networks. Connected modularity and nestedness of interaction networks with the course of ecosystem-wide extinction. Work in progress with Raissa D'Souza and Weiran Cai.
- *Entrainment of Coupled Oscillators*, research project at Los Alamos National Lab, *Summer 2016-2017*
 - Developed a model of coupled phase oscillators subject to common forcing, and derived analytic results capturing the trade-offs between coupling and forcing. Corroborated analysis with numerical simulation, including numerical continuation using AUTO software. Work done in collaboration with staff scientists Anatoly Zlotnik and Aric Hagberg.
 - Published in *Chaos*, aip.scitation.org/doi/full/10.1063/1.4994567
- *Mean-field limits for interacting diffusions*, group project at CRITICS Summer School, Kulhuse, Denmark, *September 2016*
 - Studied a system of attractively coupled particles in a bistable potential using a nonlinear Fokker-Planck equation, with support from numerical simulation.
- *Computing Geometric Integrated Information*, class project for Numerical Optimization (MAT-258A), *Fall 2015*
 - Implemented an optimization algorithm to compute an information measure which quantifies the extent of causal interactions between components of a stochastic process, and applied this algorithm to primate social network data.

Publications

- *Stability of Entrainment of a Continuum of Coupled Oscillators*, with Anatoly Zlotnik and Aric Hagberg (2017, *Chaos*, aip.scitation.org/doi/full/10.1063/1.4994567)

Relevant Coursework

- CRITICS Summer School and Workshop, Kulhuse, Denmark, *September 2016*
 - Mathematical theory of critical transitions in complex systems: center manifold reduction, bifurcation theory and its extension to non-autonomous and random dynamical systems, and associated statistical issues. Applications to climate systems, ecology, and economics.
- Stochastic Population Dynamics, *PBG 298, Spring 2016, Spring 2017*
 - Rigorous results for discrete-time population models under demographic and environmental stochasticity. Random Perron-Frobenius theorem.
 - Probability generating functions, asymptotics for Markov chains with and without absorbing states
- Stochastic Dynamics, *MAT 236A, Fall 2014*
 - Brownian motion, Itô calculus, Fokker-Planck equations, martingales. Applications to finance.
- Probability Theory, *MAT 235A-B, Fall 2014 - Winter 2015*
 - Measure-theoretic foundations, convergence of probability measures, conditional probability
- Natural Computation and Self-Organization, *PHY 256A-B, Winter - Spring 2014*
 - Information theory, inference of causal architecture for discrete stochastic processes
- Applied Math, *MAT 207A,B,C, academic year 2013-2014*
 - Three-quarter sequence covering dynamical systems, bifurcation theory, calculus of variations, Fourier series, basics of PDE, and asymptotic methods

Service

- Mx16 Conference on Multilayer Networks Co-Organizer, *Spring 2016*
 - International student-run conference featuring Alex Arenas, Lada Adamic, Matt Brashears, Francesco Sorrentino, and Mikko Kivelä
 - Link: <http://multinets.ucdavis.edu/>
- Galois Group (Math grad student association)
 - Vice President, *academic year 2015-2016*
 - President, *academic years 2016-2018*
- Davis Math Conference Co-Organizer, *Fall 2015*

Presentations

Poster

- *Entrainment of Coupled Oscillators*, CRITICS Workshop, Kulhuse, Denmark, *September 2016*
- *Stability of Entrainment in Coupled Oscillators*
 - Dynamics Days 2017, Silver Spring, MD, *January 2017*
 - 2017 SIAM Conference on Dynamical Systems, Snowbird, UT, *May 2017*
 - International Physics of Living Systems (iPoLS) 2017 Annual Meeting, Paris, France, *June 2017*

Honors and Awards

- Math Department Travel Award, *January 2017*
- Graduate Assistance in Areas of National Need (GAANN) Fellowship, *academic year 2014-2015*
- Rensselaer Dean's List, *Fall 2009 - Spring 2013*

Skills

- Programming
 - Python (packages: NumPy, SciPy, NetworkX, CMPy)
 - AUTO-07p software for continuation and bifurcation problems in ordinary differential equations
 - MATLAB
 - Julia