Jason Swanson

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Education

Ph.D. in mathematics — **University of Washington** — **2004**
Dissertation title: *Variations of Stochastic Processes: Alternative Approaches*
Dissertation advisors: Krzysztof Burdzy and Zhen-Qing Chen

M.S. in mathematics — **University of Washington** — **2003**

B.S. in mathematics — **University of Washington** — **1998**
Graduated with distinction in mathematics

Employment

Associate Professor — **University of Central Florida** — **2012–present**

Assistant Professor — **University of Central Florida** — **2007–2012**

VIGRE Van Vleck Assistant Professor — **University of Wisconsin-Madison** — **2004–2007**
Faculty mentor: Thomas G. Kurtz

Teaching Assistant — **University of Washington** — **1999–2004**

Grants, Honors, and Awards

University of Central Florida Teaching Incentive Program Award — **2012**

Visiting Fellowship — **2010**
Isaac Newton Institute for the Mathematical Sciences, Cambridge, England

NSF Conference Grant 0957479 — **2010–2012**

NSA Grant H98230-09-1-0079 — **2009–2011**

VIGRE Van Vleck Assistant Professorship **2004–2007**
Department of Mathematics, University of Wisconsin-Madison

VIGRE Graduate Fellowship **2002–2004**
Department of Mathematics, University of Washington

Academic Excellence Award **2000**
Department of Mathematics, University of Washington

ARCS (Achievement Rewards for College Scientists) Fellowship **1999–2002**
Department of Mathematics, University of Washington

Gullickson Memorial Scholarship for outstanding achievement in math **1995**
Department of Mathematics, University of Washington

Publications

1. Jason Swanson. *The Principles of Probability: From Formal Logic to Measure Theory to the Principle of Indifference*, 238 pages, Submitted for publication, August 2024.

2. Tyler Gomez, Jason Swanson, Alexandru Tamasan. A filtering problem in stochastic tomography. Preprint, 2024.

3. Thomas G. Kurtz, Jason Swanson Finite Markov chains coupled to general Markov processes and an application to metastability II. *Stochastic Analysis, Filtering, and Stochastic Optimization: A Commemorative Volume to Honor Mark H. A. Davis's Contributions*, pages 293–307, Springer 2022.

4. Thomas G. Kurtz, Jason Swanson Finite Markov chains coupled to general Markov processes and an application to metastability I. *Stochastic Analysis, Filtering, and Stochastic Optimization: A Commemorative Volume to Honor Mark H. A. Davis's Contributions*, pages 309–337, Springer 2022.

5. Davar Khoshnevisan, Jason Swanson, Yimin Xiao, and Liang Zhang. Weak existence of a solution to a differential equation driven by a very rough fBm. Preprint, arxiv:1309.3613, May 2015.

6. David Nualart and Jason Swanson. Joint convergence along different subsequences of the signed cubic variation of fractional Brownian motion II. *Electron. Commun. Probab.*, 18:no. 81, 1–11, 2013. `arXiv:1303.0892`.

7. Krzysztof Burdzy, David Nualart, and Jason Swanson. Joint convergence along different subsequences of the signed cubic variation of fractional Brownian motion. *Probability Theory and Related Fields*, pages 1–36, 2013. `arXiv:1210.1560`.

8. Jason Swanson. The calculus of differentials for the weak stratonovich integral. In Frederi Viens, Jin Feng, Yaozhong Hu, and Eulalia Nualart, editors, *Malliavin Calculus and Stochastic Analysis*, volume 34 of *Springer Proceedings in Mathematics & Statistics*, pages 95–111. Springer US, 2013. `arXiv:1103.0341v2`.

9. Ivan Nourdin, Anthony Réveillac, and Jason Swanson. The weak Stratonovich integral with respect to fractional Brownian motion with Hurst parameter 1/6. *Electron. J. Probab.*, 15:2087–2116, 2010. `http://www.math.washington.edu/~ejpecp/`, `arXiv:1006.4238`

10. Jason Swanson. Fluctuations of the empirical quantiles of independent Brownian motions. *Stochastic Process. Appl.*, 121(3):479–514, 2011. http://dx.doi.org/10.1016/j.spa.2010.11.012, arXiv:0812.4102

11. Krzysztof Burdzy and Jason Swanson. A change of variable formula with Itô correction term. *Ann. Probab.*, 38(5):1817–1869, 2010. http://dx.doi.org/10.1214/09-AOP523, arXiv:0802.3356

12. Krzysztof Burdzy, Soumik Pal, and Jason Swanson. Crowding of Brownian spheres. *ALEA Lat. Am. J. Probab. Math. Stat.*, 7:192–205, 2010. http://alea.impa.br/english/index_v7.htm, arXiv:1002.1057v1

13. Jason Swanson. Variations of the solution to a stochastic heat equation. *Ann. Probab.*, 35(6):2122–2159, 2007. http://dx.doi.org/10.1214/009117907000000196, arXiv:math/0601007

14. Teunis J. Ott and Jason Swanson. Asymptotic behavior of a generalized TCP congestion avoidance algorithm. *J. Appl. Probab.*, 44(3):618–635, 2007. http://dx.doi.org/10.1239/jap/1189717533, arXiv:math/0608476

15. Jason Swanson. Weak convergence of the scaled median of independent Brownian motions. *Probab. Theory Related Fields*, 138(1-2):269–304, 2007. http://dx.doi.org/10.1007/s00440-006-0024-3, arXiv:math/0507524

16. Teunis J. Ott and Jason Swanson. Stationarity of some processes in transport protocols. *SIGMETRICS Perform. Eval. Rev.*, 34(3):30–32, 2006. http://dx.doi.org/10.1145/1215956.1215969

Invited Talks

1. "A complete and σ-compact calculus for inductive logic in $\mathcal{L}_{\omega_1,\omega}$", presented at Recent Progress in Stochastic Analysis and its Applications, Loyola University Chicago, Chicago, IL, July 16, 2024.

2. "Finite Markov chains coupled to general Markov processes and an application to metastability", presented at the University of Washington Probability Seminar, University of Washington, Seattle, WA, November 13, 2023.

3. "Finite Markov chains coupled to general Markov processes and an application to metastability", presented at the 13th AIMS Conference on Dynamical Systems, Differential Equations and Applications, University of North Carolina Wilmington, Wilmington, NC, June 2, 2023.

4. AIMS Conference on Dynamical Systems, Differential Equations and Applications, 2021. (Cancelled due to COVID.)

5. "Metastability and coupling of Markov processes", presented at the 2018 Probability Workshop in Gyeongju, Gyeongju, Korea, August 4, 2018.

6. "A filtering problem in stochastic tomography", presented at the 3rd Workshop on Probability Theory and its Applications, Seoul National University, Seoul, Korea, December 13, 2016.

7. "A filtering problem in stochastic tomography", presented at the 11th AIMS Conference on Dynamical Systems, Differential Equations and Applications, Special Session on Recent trends on PDEs driven by Gaussian processes with applications, Orlando, Florida, July 3, 2016.

8. "Joint convergence along different subsequences of the signed cubic variation of fractional Brownian motion," presented at the 7th International Conference on Stochastic Analysis and its Applications, Seoul National University, Seoul, Korea, August 10, 2014.

9. "Joint convergence along different subsequences of the signed cubic variation of fractional Brownian motion," presented at the AMS 2014 Southeast Spring Sectional Meeting, Special Session on Stochastic Processes and Related Topics, University of Tennessee, Knoxville, TN, March 22, 2014.

10. "The calculus of differentials for the weak Stratonovich integral," presented at the AMS 2012 Spring Central Section Meeting, Special Session on Stochastic Analysis, University of Kansas, Lawrence, KS, March, 2012.

11. "The calculus of differentials for the weak Stratonovich integral," presented at Foundations of Stochastic Analysis, Banff International Research Station, Banff, AB, September 2011.

12. "The calculus of differentials for the weak Stratonovich integral," presented at Ambit Stochastics – Theoretical Developments and Applications to Energy, Turbulence and Finance, Sandbjerg Estate (Aarhus University), Sønderborg, Denmark, September 2011.

13. "A change of variable formula with Itô correction term," presented at AMS 2011 Spring Southeastern Sectional Meeting, Special Session on Recent Developments in Stochastic Partial Differential Equations, University of Nevada, Las Vegas, NV, April 2011.

14. "The weak Stratonovich integral with respect to fractional Brownian motion with Hurst parameter 1/6," presented at the International Conference on Malliavin Calculus and Stochastic Analysis in Honor of Professor David Nualart, University of Kansas, Lawrence, KS, March 2011.

15. "A change of variable formula with Itô correction term," presented at the Stochastic Partial Differential Equations Programme, Isaac Newton Institute for Mathematical Sciences, Cambridge, UK, May 2010.

16. "Fluctuations of the empirical quantiles of independent Brownian motions," presented at the Purdue Workshop on Stochastic Analysis, Purdue University, West Lafayette, IN, September 2009.

17. "Fluctuations of the empirical quantiles of independent Brownian motions," presented at the 3rd International Conference on Stochastic Analysis and Its Applications, Beijing Institute of Technology, Beijing, China, July 2009.

18. "Fluctuations of the empirical quantiles of independent Brownian motions," presented at AMS 2009 Spring Southeastern Sectional Meeting, Special Session on Stochastic Dynamics, North Carolina State University, Raleigh, NC, April 2009.

19. "A change of variable formula with Itô correction term," presented at AMS 2008 Fall Southeastern Sectional Meeting, Special Session on Gaussian Analysis & Stochastic Partial Differential Equations, University of Alabama-Huntsville, Huntsville, AL, October 2008.

20. "A change of variable formula with Itô correction term," presented at 2nd International Conference on Stochastic Analysis and Its Applications, Seoul National University, Seoul, Korea, May 2008.

21. "The median of independent Brownian motions and other colliding particle models", presented at 32nd SIAM Southeastern-Atlantic Section Conference, Special session on Probability Theory and Applications, University of Central Florida, Orlando, FL, March 2008.

22. "Metastability and coupling of Markov processes," presented at International Conference on Stochastic Analysis and its Applications, University of Washington, Seattle, WA, August 2006.

Courses Taught

University of Central Florida

MAP 4113: Probability, Random Processes and Applications (Spring 2024, Fall 2023, Spring 2022, Spring 2021, Fall 2020, Spring 2020, Fall 2016, Fall 2015, Spring 2015)
Axioms of probability and conditional probability, combinatorics, independence, random variables, joint distribution, expected value, conditional expectation, laws of large numbers, central limit theorem.

MAP 2302: Ordinary Differential Equations I (Spring 2024, Spring 2020, Spring 2019, Fall 2013)
Methods of solution for first order equations. Linear equations. Laplace transforms. Series solutions. Selected applications.

MHF 5937: Special Topics: Introduction to Mathematical Logic (Fall 2023)
This course provides an introduction to mathematical logic, including first-order logic and the axioms of set theory. The material is presented at a level suitable for beginning graduate students, as well as advanced undergraduates. As a standalone course, students will gain a deeper insight into the methods of mathematical logic and the foundations of mathematics. Students who wish to continue beyond this course will be prepared to study logic programming, model theory, and the many results connected to Gödel's incompleteness theorem.

MAC 2313H: Calculus with Analytic Geometry III, Honors (Spring 2023)
Geometry of higher dimensional Euclidean space; vectors and vector functions; partial derivatives; multiple integrals; line integrals; vector fields; Green's Theorem and Stoke's Theorem. With Honors content.

MAP 4640: Financial Mathematics (Fall 2022, Fall 2019, Spring 2016)
Binomial no-arbitrage pricing model, Martingales, Markov processes, capital asset pricing model, stopping times, American derivative securities, random walks, interest rates, fixed-income derivatives, futures.

MAA 6238: Measure and Probability I (Spring 2022, Fall 2020, Fall 2018, Fall 2016, Fall 2015, Fall 2014, Spring 2014, Spring 2009)
A first graduate course on measure theoretic probability theory. Topics include measure and integration, probability measures, random variables, distribution functions, characteristic functions, and the standard modes of convergence: in L^p, in probability, in distribution, and almost surely.

MAA 6218: Stochastic Calculus (Fall 2021)
Stochastic integration, Stochastic Differential Equations.

MAA 6245: Measure and Probability II (Spring 2021, Spring 2019, Spring 2017, Spring 2016)
Martingales, Markov Processes, stopping times, Brownian motion, Weiner measure.

MAS 3106: Linear Algebra (Fall 2019)
This is a proof-based course covering topics such as abstract vector spaces, linear transformations, isomorphisms, projections, inner products, the spectral theorem, Jordan Canonical Form, and quadratic forms.

MAC 2312: Calculus with Analytic Geometry II (Fall 2018, Spring 2014, Spring 2013, Spring 2012, Spring 2011, Spring 2010, Spring 2008)
Continuation of MAC 2311.

MAC 2313: Calculus with Analytic Geometry III (Spring 2017, Fall 2008)
Continuation of MAC 2312.

MAA 4226: Advanced Calculus I (Spring 2015)
Limits, sequences, and continuity, differentiation and integration. Derivations of integrals. Infinite series and convergence. The Balzano-Weierstrass Theorem and the Heine-Borel Theorem. Extensions to n-dimensional Euclidean space.

MHF 3302: Logic and Proof in Mathematics (Fall 2014)
Basic mathematical logic. Methods of proof in mathematics. Application of proofs to elementary mathematical structures.

MAC 2311: Calculus with Analytic Geometry I (Fall 2013, Fall 2012, Fall 2011, Fall 2010, Fall 2009, Fall 2007)
The differential and integral calculus of algebraic and elementary transcendental functions with geometric and physical applications. Topics from analytic geometry include coordinate systems, vectors, lines, conic sections, transformations of coordinates, and polar coordinates. During the 2nd and 3rd semesters the topics also include sequences and series, Taylor series, and the differential and integral calculus for functions of several variables.

MAA 6229: Analysis II (Spring 2012, Spring 2011)
Continuation of MAA 5228.

MAA 5228: Analysis I (Fall 2011, Fall 2010)
This is the first semester in a year-long, core qualifying course for incoming graduate students. Topics include real numbers, limits, differentiation, Riemann integrals, Riemann-Stieltjes integrals, calculus in $\mathbb{R}^n$, metric and normed spaces, contraction mapping theorem, inverse and implicit functions, Lebesgue measure and integration, topological spaces, Banach spaces, Hilbert spaces, bounded linear operators, distribution theory and the Fourier transform, general measure theory, and L^p spaces.

MAA 6306: Real Analysis (Spring 2010)
Sets, function spaces, Lebesgue measure, Lebesgue-Stieltjes measure, measurable functions, convergence notions, general measure and integration, Radon-Nikodym theorem.

MAC 2311H: Calculus with Analytic Geometry I, Honors (Fall 2008)
Differential and integral calculus, emphasizing understanding basic concepts and their applications. Students will complete projects on their own. For honors students from all disciplines.

University of Wisconsin-Madison

Introduction to Probability Theory (Spring 2007)
A first course in probability at the undergraduate level, with topics including probability in discrete sample spaces, methods of enumeration (combinatorics), conditional probability, random variables, properties of expectations, the Weak Law of Large Numbers, and the Central Limit Theorem.

Introduction to Stochastic Processes (Fall 2006)
This course gives an introduction to Markov chains and Markov processes with discrete state spaces and their applications. Particular models studied include birth-death chains, queuing models, random walks and branching processes. Selected topics from renewal theory and Brownian motion are also included.

Basic Concepts of Mathematics (Spring 2006)
This course teaches the writing of rigorous mathematical proofs, by first covering some basic concepts of logic needed for mathematical proofs, and then working with those concepts on many examples from different areas of mathematics. The course also introduces the student to some of the abstract concepts of mathematics used in higher level math courses, such as equivalence relations, orderings, and a rigorous treatment of mathematical induction and the real numbers.

Directed Study (Fall 2005)
Supervised a senior undergraduate student in the study of Brownian motion and stochastic calculus.

Stochastic Analysis (Fall 2005)
A graduate course covering the foundations of continuous time stochastic processes, semimartingales and the semimartingale integral, Itô's formula, stochastic differential equations, stochastic equations for Markov processes, and applications in finance, filtering, and control.

An Introduction to Brownian Motion and Stochastic Calculus (Spring 2005)
An advanced undergraduate introduction to Brownian motion and stochastic calculus that does not require knowledge of measure theory.

The Theory of Single Variable Calculus (Fall 2004)
This course covers material in first and second semester calculus but it is intended to teach math majors to write and understand proofs in mathematics in general and in calculus in particular.

University of Washington

Introduction to ordinary differential equations
Linear Analysis and Introduction to Partial Differential Equations
Advanced Multivariable Calculus
Algebra in business and economics (teaching assistant)
First-year calculus (teaching assistant)
Undergraduate abstract algebra (teaching assistant)
Graduate complex analysis (teaching assistant)

Seminars and Conferences Organized

Recent Progress in Stochastic Analysis and its Applications, Loyola University Chicago	2024
Probability and Statistics Seminar, University of Central Florida	2021, 2014-2015, 2008–2010
Qualifying examination preparation seminar, University of Central Florida	2019
Qualifying examination preparation seminar, University of Central Florida	2012
Qualifying examination preparation seminar, University of Central Florida	2011
Seminar on Stochastic Processes 2010	Mar 2010
Probability Seminar, University of Wisconsin-Madison	2005–2007