Micah Warren — Curriculum Vitae

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Education

- **University of Washington**, Seattle, WA
  M.S., Mathematics, June 2006; Ph.D., Mathematics, June 2008.
- **Pacific Lutheran University**, Parkland, WA
  B.S., Mathematics, June 2000; B.A., Physics, June 2000.

Appointments

- Associate Professor of Mathematics, University of Oregon, Sept. 2019–Present.
- Assistant Professor of Mathematics, University of Oregon, Sept. 2013–Sept. 2019.
- Assistant Professor of Mathematics, Princeton University, July 2011–Aug. 2013.
- Instructor of Mathematics, Princeton University, 2008–2011.
- Predoctoral Teaching Assistant, University of Washington, Autumn 2000–Spring 2008.

Grant Support and Awards

- University of Oregon Office of the Provost Book Publication Award for *Bitcoin: A Game-Theoretic Analysis*, 2023.
- NSF Grant DMS-1438359 (DMS-1161498), *Hessian Equations with Geometric Applications*, 2012–2015 (extended until 2017).
- NSF Grant DMS-0901644, *Hessian and Special Lagrangian Equations*, 2009–2012.
- Liftoff Fellow, Clay Institute Liftoff Program, Summer 2008.
- VIGRE Fellow, University of Washington Mathematics Department, Autumn 2006–Summer 2007.

Preprints

1. Micah Warren. *Censorship as Bitcoin Grows*. Preprint. https://github.com/micah541/censorship/blob/main/Oct13_2026.pdf

Submitted

1. Jingyi Chen and Micah Warren. *A Geometric Flow Towards Hamiltonian Stationary Submanifolds*. Preprint. https://arxiv.org/abs/2403.13997 (33 pages).
2. Arunima Bhattacharya, Micah Warren, and Daniel Weser. *Optimal Transport and Generalized Lagrangian Mean Curvature Flows on Kim–McCann Metrics*. Preprint. https://arxiv.org/abs/2603.20498 (53 pages).

Published Papers

*Denotes a co-author who was the author's doctoral student during some part of the collaboration.

1. Micah Warren. *A Quantitative Stability Result for Regularity of Optimal Transport on Compact Manifolds. Calc. Var. Partial Differential Equations* **65** (2026), Paper No. 214. https://doi.org/10.1007/s00526-026-03367-5

2. W. Jacob Ogden and Micah Warren. *Grim Raindrop: A Translating Solution to Curve Diffusion Flow. Proc. Amer. Math. Soc.* **154** (2026), no. 1, 379–391. https://doi.org/10.1090/proc/17505

3. Micah Warren. *Continuum Nash Bargaining Solutions. Nonlinear Differential Equations and Applications* **32** (2025), no. 6, Paper 109, 20 pp. https://doi.org/10.1007/s00030-025-01118-7

4. Micah Warren. *Minimal Lagrangian Submanifolds of Weighted Kim–McCann Metrics. Canad. Math. Bull.* **68** (2025), no. 4, 1223–1238. https://doi.org/10.4153/S0008439525000487

5. Arunima Bhattacharya, Micah Warren, and Daniel Weser. *A Liouville Type Theorem for Ancient Lagrangian Mean Curvature Flows. Comm. Partial Differential Equations* **50** (2025), no. 1–2, 118–129. https://doi.org/10.1080/03605302.2024.2439351

6. Jingyi Chen and Micah Warren. *Compactification of the Space of Hamiltonian Stationary Lagrangian Submanifolds with Bounded Total Extrinsic Curvature and Volume. J. Differential Geom.* **126** (2024), no. 1, 65–97. https://doi.org/10.4310/jdg/1707767335

7. Arunima Bhattacharya, Jingyi Chen, and Micah Warren. *Regularity of Hamiltonian Stationary Equations in Symplectic Manifolds. Adv. Math.* **424** (2023), Paper No. 109059, 32 pp. https://doi.org/10.1016/j.aim.2023.109059

8. Antonio Ache and Micah Warren. *Approximating Coarse Ricci Curvature on Submanifolds of Euclidean Space. Adv. Geom.* **22** (2022), no. 2, 215–243. https://doi.org/10.1515/advgeom-2022-0002

9. Arunima Bhattacharya* and Micah Warren. *$C^{2,\alpha}$ Estimates for Solutions to Almost Linear Elliptic Equations. Commun. Pure Appl. Anal.* **20** (2021), no. 4, 1363–1383. https://doi.org/10.3934/cpaa.2021024

10. Arunima Bhattacharya* and Micah Warren. *Regularity Bootstrapping for Nonlinear Fourth-Order Equations of Double Divergence Type. Int. Math. Res. Not. IMRN* (2021), no. 6, 4324–4348. https://doi.org/10.1093/imrn/rny301

11. Arunima Bhattacharya* and Micah Warren. *Interior Schauder Estimates for the Fourth Order Hamiltonian Stationary Lagrangian Equation in Dimension Two. Proc. Amer. Math. Soc.* **147** (2019), no. 8, 3471–3477. https://doi.org/10.1090/proc/14484

12. Jingyi Chen and Micah Warren. *On the Regularity of Hamiltonian Stationary Lagrangian Submanifolds. Adv. Math.* **343** (2019), 316–352. https://doi.org/10.1016/j.aim.2018.11.020

13. Antonio Ache and Micah Warren. *Coarse Ricci Curvature and the Manifold Learning Problem. Adv. Math.* **342** (2019), 14–66. https://doi.org/10.1016/j.aim.2018.11.001

14. Jingyi Chen and Micah Warren. *Radial Solutions of a Fourth Order Hamiltonian Stationary Equation. J. Differ. Equ.* **265** (2018), 1576–1595. https://doi.org/10.1016/j.jde.2018.04.011

15. Gregory Drugan, Weiyong He, and Micah Warren. *Legendrian Curve Shortening Flow in* $\mathbb{R}^3$. *Comm. Anal. Geom.* **26** (2018), no. 4, 759–786. https://doi.org/10.4310/cag.2018.v26.n4.a4

16. Antonio Ache and Micah Warren. *Coarse Ricci Curvature as a Function on* $M \times M$. *Results Math.* **72** (2017), 1823–1837. https://doi.org/10.1007/s00025-017-0746-9

17. Micah Warren. *A Liouville Property for Gradient Graphs and a Bernstein Problem for Hamiltonian Stationary Equations. Manuscripta Math.* **150** (2016), no. 1, 151–157. https://doi.org/10.1007/s00229-015-0801-3

18. Micah Warren. *A Bernstein Result and Counterexample for Entire Solutions to Donaldson's Equation. Proc. Amer. Math. Soc.* **144** (2016), no. 7, 2953–2958. https://doi.org/10.1090/proc/12960

19. Jeffrey Streets and Micah Warren. *Evans–Krylov Estimates for a Nonconvex Monge–Ampère Equation. Math. Ann.* **365** (2016), no. 1–2, 805–834. https://doi.org/10.1007/s00208-015-1293-x

20. Micah Warren. *Non-Polynomial Entire Solutions to* σ_k *Equations. Comm. Partial Differential Equations* **41** (2016), no. 5, 848–853. https://doi.org/10.1080/03605302.2015.1123277

21. Micah Warren. *On Solutions to Cournot–Nash Equilibria Equations on the Sphere. Pac. J. Math.* **272** (2014), no. 2, 423–437. https://doi.org/10.2140/pjm.2014.272.423

22. Jun Kitagawa and Micah Warren. *Regularity of Optimal Transport with Euclidean Distance Squared Cost on the Embedded Sphere. SIAM J. Math. Anal.* **44** (2012), no. 4, 2871–2887. https://doi.org/10.1137/120865409

23. Robert McCann, Brendan Pass, and Micah Warren. *Rectifiability of Optimal Transportation Plans. Can. J. Math.* **64** (2012), 924–933. https://doi.org/10.4153/CJM-2011-080-6

24. Young-Heon Kim, Jeffrey Streets, and Micah Warren. *Parabolic Optimal Transport Equations on Manifolds. Int. Math. Res. Not.* (2012), no. 19, 4325–4350. https://doi.org/10.1093/imrn/rnr188

25. Micah Warren. *A McLean Theorem for the Moduli Space of Lie Solutions to Riemannian Transport Equations. Differential Geom. Appl.* **29** (2011), 816–825. https://doi.org/10.1016/j.difgeo.2011.08.009

26. Micah Warren. *Regularity for a Log-Concave to Log-Concave Mass Transfer Problem with Near Euclidean Cost. Comm. Anal. Geom.* **19** (2011), no. 1, 191–208. https://doi.org/10.4310/cag.2011.v19.n1.a6

27. Matthew Gursky, Jeffrey Streets, and Micah Warren. *Existence of Complete Conformal Metrics of Negative Ricci Curvature on Manifolds with Boundary. Calc. Var. Partial Differential Equations* **41** (2011), no. 1–2, 21–43. https://doi.org/10.1007/s00526-010-0352-0

28. Matthew Gursky, Jeffrey Streets, and Micah Warren. *Conformally Bending Three-Manifolds with Boundary. Ann. Inst. Fourier (Grenoble)* **60** (2010), no. 6, 2421–2447. https://doi.org/10.5802/aif.2613

29. Young-Heon Kim, Robert McCann, and Micah Warren. *Calibrating Optimal Transportation with Pseudo-Riemannian Geometry. Math. Res. Lett.* **17** (2010), no. 6, 1183–1197. https://doi.org/10.4310/mrl.2010.v17.n6.a16

30. Simon Brendle and Micah Warren. *A Boundary Value Problem for Minimal Lagrangian Graphs.* *J. Differential Geom.* **84** (2010), 267–287. https://doi.org/10.4310/jdg/1274707314

31. Micah Warren. *Calibrations Associated to Monge–Ampère Equations.* *Trans. Amer. Math. Soc.* **362** (2010), no. 8, 3947–3962. https://doi.org/10.1090/S0002-9947-10-05109-3

32. Micah Warren and Yu Yuan. *Hessian and Gradient Estimates for Three-Dimensional Special Lagrangian Equations with Large Phase.* *Amer. J. Math.* **132** (2010), no. 3, 751–770. https://doi.org/10.1353/ajm.0.0115

33. Jingyi Chen, Micah Warren, and Yu Yuan. *Hessian Estimates for Convex Solutions to Special Lagrangian Equations.* *Comm. Pure Appl. Math.* **62** (2009), no. 4, 583–595. https://doi.org/10.1002/cpa.20261

34. Micah Warren and Yu Yuan. *Hessian Estimates for the Sigma-2 Equation in Dimension Three.* *Comm. Pure Appl. Math.* **62** (2009), no. 3, 305–321. https://doi.org/10.1002/cpa.20251

35. Micah Warren and Yu Yuan. *Explicit Gradient Estimates for Minimal Lagrangian Surfaces of Dimension Two.* *Math. Z.* **262** (2008), no. 4, 867–879. https://doi.org/10.1007/s00209-008-0403-9

36. Micah Warren and Yu Yuan. *A Liouville Type Theorem for Special Lagrangian Equations with Constraints.* *Comm. Partial Differential Equations* **33** (2008), no. 4–6, 922–932. https://doi.org/10.1080/03605300801970986

Contributions to Formalized Mathematics

- *Formalization of Short-Time Existence for Higher-Order Parabolic Equations* (Lean 4), October 2026. https://github.com/micah541/parabolic-short-time-lean
  Machine-checked proof that fully nonlinear parabolic equations of any even order on tensor bundles over closed Riemannian manifolds have unique smooth short-time solutions that depend continuously on the initial data in C^∞. As a consequence, the Mantegazza–Martinazzi theorem for scalar quasilinear equations is proved. About 56,000 lines of Lean 4 over Mathlib, with a companion paper as the blueprint. Developed jointly with Claude (Claude Code, an AI system from Anthropic).

Book

Bitcoin: A Game-Theoretic Analysis. de Gruyter, 2023, 328 pp., ISBN: 9783110772838.

Minicourses

July 2014 — "Lower Ricci Curvature Bounds on Metric Measure Spaces." Xi'an Jiaotong University, Xi'an, China.

Upcoming Invited Talks

- Oct. 27, 2026. University of Oregon, Geometric Analysis Seminar.
- Nov. 3, 2026. New York University, Convexity Seminar. Talk: *Counterexample to Carathéodory Conjecture*.

Invited Talks

- Sept. 17, 2026. Johns Hopkins University, Geometric Analysis Seminar.
- Aug. 3, 2026. "Geometric Flows and Related Topics", BIRS, Banff, Canada. Talk: *A Geometric Flow Towards Hamiltonian Stationary Submanifolds*.
- Jul. 14, 2026. 1st Annual UW Bitcoin Research Institute Workshop, University of Wyoming. Talk: *Censorship as Bitcoin Grows*.
- Apr. 2026. Annual Bitcoin Conference, Las Vegas. Talk: *The Game Theory Behind Miner Centralization* (Energy Stage); Panel participant: *Incentives & Illusions in Prediction Markets* (Enterprise Stage).
- Oct. 2025. Princeton University, Differential Geometry / Geometric Analysis Seminar.
- Aug. 2025. Fall Western Sectional Meeting (Special Session on Nonlinear Elliptic PDEs and Geometry).
- Jun. 2025. International Workshop on Fully Nonlinear PDEs (Online, Shanghai).
- Aug. 2024. Optimal Transport and Dynamics, BIRS Casa Matemática Oaxaca, Oaxaca, Mexico.
- May 2024. Special Session on Partial Differential Equations and Convexity, Spring Western Sectional Meeting, San Francisco, CA.
- Aug. 2023. Non-Linear Critical Point Theory in Analysis and Geometry, BIRS, Kelowna, B.C.
- Jun. 2023. PDE in Seoul 2023: Conference in honor of Prof. Mikhail Safonov's 70th birthday, Seoul, South Korea.
- May 2023. University of Oregon Basic Notions Seminar.
- Nov. 2022. University of Oregon Geometric Analysis Seminar.
- Jul. 2021. Universität Konstanz Differential Geometry Seminar (remote).
- Nov. 2019. Fall Western Sectional Meeting, Riverside, CA.
- Oct. 2019. University of Oregon Machine Learning Meetup, Falling Sky Pizzeria, Eugene, OR.
- Oct. 2018. University of Oregon Geometric Analysis Seminar.
- Apr. 2018. Spring Western Sectional Meeting, Portland, OR.

- Feb. 2018. Conference on Geometric and Nonlinear Partial Differential Equations, NSW, Australia.
- Dec. 2017. University of Oregon Basic Notions Seminar.
- Oct. 2017. University of Oregon Geometric Analysis Seminar.
- Jun. 2017. Dynamical Geometric Analysis in Orsay, Orsay, France.
- May 2017. University of Oregon Geometric Analysis Seminar.
- Apr. 2017. Generated Jacobian Equations, Banff International Research Station.
- Oct. 2016. UC Irvine Differential Geometry Seminar.
- Oct. 2016. University of Oregon Geometric Analysis Seminar.
- Mar. 2016. TODA Seminar, The Ohio State University.
- Feb. 2016. UBC Differential Geometry / Geometric Analysis Seminar, Vancouver, BC.
- Sept. 2015. Princeton University, Differential Geometry / Geometric Analysis Seminar.
- Sept. 2015. PDE / Applied Math Seminar, Indiana University.
- Aug. 2015. Conference on Analysis and Geometry, Hefei, Anhui, China.
- Apr. 2015. University of Oregon Geometric Analysis Seminar.
- Feb. 2015. University of Oregon Geometric Analysis Seminar.
- Feb. 2015. University of Oregon Probability Seminar.
- Oct. 2014. UC Irvine Differential Geometry Seminar.
- Oct. 2014. University of Oregon Geometric Analysis Seminar.
- May 2014. University of Oregon Geometric Analysis Seminar.
- Nov. 2013. University of Oregon Probability Seminar.
- Oct. 2013. University of Oregon Geometric Analysis Seminar.
- Oct. 2012. University of Washington Differential Geometry Seminar.
- Oct. 2012. Modern Math Workshop, Seattle, WA.
- Apr. 2012. Manifolds with Special Holonomy and their Calibrated Submanifolds and Connections, Banff International Research Station.
- Jul. 2011. Workshop on Partial Differential Equations, Oberwolfach, Germany.
- Nov. 2010. Workshop on Geometric Probability and Optimal Transportation, Fields Institute, Toronto.
- Sept. 2010. Columbia Geometry / Analysis Seminar.
- Apr. 2010. Optimal Transportation and Applications, Banff International Research Station, Banff, Canada.
- Mar. 2010. CUNY Differential Geometry Seminar.
- Dec. 2009. PDE Seminar, Brown University.

- Oct. 2009. Geometry/Topology Seminar, Stony Brook University.
- Oct. 2009. Differential Geometry / Geometric Analysis Seminar, Princeton University.
- Jul. 2009. Differential Geometry / Mathematical Physics / PDE Seminar, University of British Columbia.
- Apr. 2009. Differential Geometry and Geometric Analysis Seminar, Princeton University.
- Nov. 2008. Institute for Advanced Study.
- Nov. 2008. Nonlinear Analysis and PDE Seminar, Rutgers University.
- Mar. 2008. Differential Geometry and Geometric Analysis Seminar, Princeton University.
- Dec. 2007. Minimal Submanifolds and Related Problems, Banff International Research Station, Banff, Canada.
- Nov. 2007. Differential Geometry / Mathematical Physics / PDE Seminar, University of British Columbia.
- Jul. 2007. Workshop on Partial Differential Equations, Oberwolfach, Germany.
- May 2007. UW Differential Geometry / PDE Seminar.

Podcasts and Digital Events

- Oct. 15, 2026. Guest appearance on **Bitcoin Magazine TV**, segment: *"Math professor warns of threat to Bitcoin from AI Pivot"*.
- *Diverging Limits* podcast (host) — Sept. 30, 2026. Guest: Scott Armstrong. Practical advice for Lean formalization and using AI tools.
- *Diverging Limits* podcast (host) — Sept. 13, 2026. Guest: Matt Ballard. Lean formalization and AI in mathematics.
- *Bitcoin Skepticism with Micah Warren* — **Bitcoin Frontier Podcast**, April 2024.
- *How to Attack Bitcoin (feat. Micah Warren)* — Episode 120, **Crypto Critics Corner**, June 2023.
- *Bitcoin: A Game-Theoretic Analysis* — de Gruyter Panel, May 2023. https://www.youtube.com/watch?v=wKr8jECz53U

Referee Service (Since 2019)

Full Referee Reports

- Acta Mathematica
- Advances in Mathematics
- American Journal of Mathematics
- Annales de l'Institut Henri Poincaré – Analyse Non Linéaire
- Archive for Rational Mechanics and Analysis

- Calculus of Variations and Partial Differential Equations
- Communications on Pure and Applied Analysis
- Duke Mathematical Journal
- IET Blockchain
- International Mathematics Research Notices
- Journal für die reine und angewandte Mathematik (Crelle's Journal)
- Journal of Functional Analysis
- Journal of Geometric Analysis
- Journal of Mathematical Analysis and Applications
- Mathematische Annalen
- Probability in the Engineering and Informational Sciences
- Transactions of the American Mathematical Society

Quick Opinions

- Advances in Mathematics
- American Journal of Mathematics
- Annals of Mathematics
- Communications on Pure and Applied Mathematics (CPAM)
- Duke Mathematical Journal
- Journal of the London Mathematical Society
- Mathematische Annalen
- Mathematische Zeitschrift
- Pacific Journal of Mathematics
- Proceedings of the American Mathematical Society
- Revista Matemática Iberoamericana
- Transactions of the American Mathematical Society

Graduate Students

- Arunima Bhattacharya (Ph.D., 2019).
  Currently: Assistant Professor, University of North Carolina at Chapel Hill.

Post-docs mentored

- Jesse Madnick (2022-2024)
  Currently: Assistant Professor, Seton Hall University.

Committee Service, Seminar Organization, and Other Activities

- Postdoctoral Search Committee, 2016–2017; 2021–2022 (chair); 2023–2024; 2024–2025 (chair), 2025-2026.
- UO Math Climate Committee, 2023–2024, 2025–2026.
- UO Math Teaching Effectiveness Committee, 2020–2021, 2022–2023, 2023–2024, 2024–2025, 2025–2026.
- Orals Exam Committee: Demetre Kazaras (graduated 2017), Gavin Armstrong (2018), Gabriel Montes de Oca (2020), Hanming Liu (current), Luke Baker (current).
- University of Oregon Library Committee, 2023–2026.
- University of Oregon Faculty Senate, 2023–2025.
- UO Math WeBWorK Committee, 2022–2023.
- UO Math Advising Committee, 2022–2023.
- Graduate Affairs Ph.D. Committee, 2018–2019.
- Assessment Committee, 2018.
- Travel Committee, 2017–2018; 2018–2019 (chair).
- Colloquium Committee, 2015–2016.
- Open Search Committee, Winter 2014–2015.
- Organizer, University of Oregon Geometric Analysis Seminar, Spring 2014–Sept. 2019.
- University of Oregon Math Department Scholarships and Awards Committee, Spring 2014.
- Graduate Admissions Committee, Princeton University, 2012, 2013.
- Undergraduate Placement Officer, Princeton University, July 2011–June 2013.
- Organizer, Princeton University Differential Geometry and Geometric Analysis Seminar, Sept. 2008–2012.
- Reviewer for Mathematical Reviews.

Teaching — University of Oregon

- Math 685: Elliptic PDE — Winter/Spring 2026.
- Math 351: Numerical Analysis I — Fall 2025.
- Math 637/638/639: Differential Geometry — Fall 2014; Winter 2015; Spring 2015; Fall 2016; Fall 2025.
- Math 433: Differential Geometry — Spring 2017; Spring 2020; Spring 2025.
- Math 252: Calculus II — Winter 2014; Fall 2020; Winter 2021; Fall 2024; Winter 2025.
- Clark Honors College 441: *Bitcoin: What Could Possibly Go Wrong?* — Fall 2022.
  Is Bitcoin Dead Yet? — Fall 2024.
- Math 607: Topics Course on Optimal Transport — Fall 2023.

- Math 256: Ordinary Differential Equations — Fall 2013; Spring 2016; Winter 2017; Fall 2017; Fall 2018; Fall 2020; Winter 2021 (course head 2018–2022).
- Math 251: Calculus I — Fall 2023.
- Math 415: Intro to Analysis III — Spring 2023.
- Math 253: Calculus III — Spring 2023.
- Math 107: University Math III (Mathematics of Voting and Elections) — Winter 2023.
- Math 320: Ordinary Differential Equations — Spring 2018.
- Math 618: Real Analysis — Spring 2022.
- Math 411/412: Functions of a Complex Variable — Winter/Spring 2022.
- Math 607: Mean Curvature Flow — Fall 2015.
- Math 607: Nonlinear Elliptic PDE — Spring 2014.
- Math 307: Introduction to Proof — Winter 2014.
- Math 456: Discrete Dynamical Systems — Spring 2016; Spring 2019.
- Math 461: Statistics — Fall 2017; Fall 2018.
- Math 420: Advanced ODE — Spring 2017.
- Math 422: Fourier Analysis — Winter 2018; Winter 2019.

Other Teaching / Outreach — University of Oregon

- Lecture for the SAIL program: "Economics & the Power of Math." August 2023.

Teaching — Princeton University

- Linear Algebra (MAT 204) — Spring 2013 (Course Head).
- Linear Algebra (MAT 203) — Fall 2012.
- Complex Analysis — Spring 2012.
- Differential Equations — Fall 2011.
- Math 201: Multivariable Calculus — Spring 2011 (Course Head).
- Real Analysis — Fall 2010.
- Graduate Course on Optimal Transportation (with Alice Chang) — Spring 2010.
- Math 103, 202, 201 — Instructor, 2008–2012.

Teaching — University of Washington

- Calculus with Analytic Geometry I, II, III — Instructor, three summer quarters, 2004–2006.
- Introduction to Differential Equations — Instructor, Spring 2005; Summer 2006; Fall 2006.
- Linear Analysis (Math 554) — Grader and Office Hours, 2007–2008.