Eric Baer

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Positions Held

Associate Senior Instructional Professor, 2025–present
Assistant Senior Instructional Professor, Senior Lecturer, 2019–2025
Department of Statistics and Committee on Computational and Applied Mathematics
University of Chicago
Chicago, IL.

Shelly Visiting Assistant Professor, 2018–2019
Carnegie Mellon University
Pittsburgh, PA.

Van Vleck Visiting Assistant Professor and Research Associate, 2015–2018
University of Wisconsin, Madison
Madison, WI.

Pure Math Instructor and NSF Postdoctoral Fellow, 2012–2015
Massachusetts Institute of Technology
Cambridge, MA.

Education

Ph.D. in Mathematics, 2012.
Department of Mathematics, University of Texas at Austin, Austin, TX.
Thesis: "Symmetry properties of crystals and new bounds from below on the temperature in compressible fluid dynamics"
Advisor: Alessio Figalli.

M.S. in Mathematical Sciences, 2006.
Department of Mathematical Sciences, Carnegie Mellon University, Pittsburgh, PA.
Thesis: "Some Properties of Fractional Sobolev Spaces"
Advisor: Giovanni Leoni.

B.S. in Mathematical Sciences, 2006.
Department of Mathematical Sciences, Carnegie Mellon University, Pittsburgh, PA.

Publications and Preprints

1. E. Baer and A. Vasseur. A bound from below on the temperature for the Navier-Stokes-Fourier system. SIAM J. Math. Anal. 45 (2013), no. 4, pp. 2046–2063.

2. E. Baer. Minimizers of anisotropic surface tensions under gravity: higher dimensions via symmetrization. Arch. Ration. Mech. Anal. 215 (2015), no. 2, pp. 531–578.

3. E. Baer and D. Jerison. Optimal function spaces for continuity of the Hessian determinant as a distribution. J. Funct. Anal. 269 (2015), no. 5, pp. 1482–1514.

4. E. Baer and A. Figalli. Characterization of isoperimetric sets inside almost-convex cones. Discrete Contin. Dyn. Syst. 37 (2017), no. 1, pp. 1–14.

5. E. Baer and D. Jerison. Quantitative weak stability for Hessian determinants. Work in preparation.

Research interests

Calculus of variations, partial differential equations, harmonic analysis, geometric measure theory, applied mathematics.

Selected Invited Talks

Mathematics Seminar, Koç University, June 2024.

Analysis Seminar, Bilkent University, May 2024.

Colloquium, Bogazici University, July 2023.

Nonlinear Problems of Mathematical Physics Seminar, Koç University, July 2023.

2022 AMS Spring Central Virtual Sectional Meeting, Special Session on the Interface Between Nonlinear PDEs, Harmonic Analysis, and Quantitative Geometric and Functional Inequalities (online), March 2022.

Geometric and functional inequalities and recent topics in nonlinear PDEs (online conference), March 2021.

2019 AMS Fall Southeastern Sectional Meeting, Special Session on Nonlinear Elliptic PDE, November 2019.

Mathematics Seminar, Koç University, June 2019.

Colloquium, Purdue University Fort Wayne, April 2019.

Department Colloquium, Minnesota State University–Mankato, March 2019.

Special Colloquium, Loyola University Chicago, February 2019.

CNA Seminar, Carnegie Mellon University, November 2018.

Department Colloquium, Minnesota State University–Mankato, April 2018.

PDE Seminar, Purdue University, December 2017.

PDE/Geometric Analysis Seminar, University of Wisconsin-Madison, February 2017.

PDE/Geometric Analysis Seminar, University of Wisconsin-Madison, September 2015.

Nonlinear Analysis Seminar, Rutgers University, February 2015.

Boston University/Brown Joint Dynamics and PDE Seminar, Brown University, November 2014.

PDE/Analysis Seminar, MIT, February 2013.

Teaching

University of Chicago, 2019–present.
Undergraduate courses: Numerical Linear Algebra.
Graduate courses: Variational Methods in Image Processing, Applied Fourier Analysis, Partial Differential Equations, Nonlinear Optimization, Applied Linear Algebra, Applied Analysis.

Carnegie Mellon University, 2018–2019.
Integration and Approximation, Principles of Real Analysis I, Introduction to Ordinary Differential Equations.

University of Wisconsin-Madison, 2015–2018.
Linear Algebra and Differential Equations, Theory of Single Variable Calculus, Analysis I, Introduction to Measure and Integration.

Massachusetts Institute of Technology, 2012–2015.
Introduction to Proofs short course, 18.100C Analysis. Recitation instructor for 18.03 Differential Equations.

Mentoring

MS students.
Jay Lee (MS thesis, 2025, Statistics); next position: PhD student, Statistics, Texas A&M University
Yiwei Shi (MS thesis, 2023, Computational and Applied Mathematics); next position: PhD student, Applied Mathematics & Statistics, Stony Brook University
Ruoyu Zheng (MS thesis, 2023, Computational and Applied Mathematics); next position: PhD student, Applied Mathematics, University of Southern California
Zixuan Ling (MS thesis, 2022, Computational and Applied Mathematics); next position: PhD student, Mathematics, Michigan State University
Shenghan Mei (MS thesis, 2022, Computational and Applied Mathematics); next position: PhD student, Mathematics, University of North Carolina

Undergraduate students.
Athan Liu (BS, 2021)
Adam Christopherson (BS, 2018, University of Wisconsin, Madison); next position: PhD student, Ohio State University

Other pedagogical activities

UW-Madison Summer School in Analysis 2018.
University of Wisconsin-Madison

UW-Madison Undergraduate PDE Summer School 2017.
University of Wisconsin-Madison
Short course on "Symmetrization techniques with applications to isoperimetric problems and PDEs."

Other work experience

National Institute of Standards and Technology, Summer 2002–Summer 2004.
Mathematics Trainee, Advisor: A. Kearsley.

Fellowships and Awards

NSF Postdoctoral Fellowship; Fellowship Institution: MIT, Sponsor: D. Jerison, 2012–2015.

Frank Gerth III Dissertation Award (UT Austin), Spring 2012.

Bruton Fellowship (UT Austin), Spring 2007.

Dodd Fellowship (UT Austin), Spring 2007.

Regents Fellowship (UT Austin), Fall 2006.

Service and other activities

Assistant Director, Masters Program in Computational and Applied Mathematics, University of Chicago.

Referee for Comm. Pure. Appl. Math., J. Funct. Anal.