

**JEANNE NIELSEN CLELLAND**

Department of Mathematics, 395 UCB

University of Colorado

Boulder, CO 80309-0395

(303) 492-7083

e-mail: Jeanne.Clelland@colorado.edu

*January 29, 2021*

**EDUCATION:**

- Ph.D., Mathematics, Duke University, May 1996  
Advisor: Robert Bryant  
Dissertation: *Geometry of conservation laws for a class of parabolic partial differential equations*
- M.A., Mathematics, Duke University, May 1993
- B.S. summa cum laude, Mathematics, Duke University, May 1991

**ACADEMIC EMPLOYMENT:**

- Professor of Mathematics, University of Colorado, Fall 2014 - present
- Associate Professor of Mathematics, University of Colorado, Fall 2007 - Spring 2014
- Assistant Professor of Mathematics, University of Colorado, Fall 1998 - Spring 2007
- National Science Foundation Postdoctoral Research Fellow, Institute for Advanced Study, Princeton, NJ, Fall 1996 - Spring 1998. Advisor: Phillip Griffiths

**GRANTS, AWARDS, AND HONORS:**

- University of Colorado Undergraduate Research Opportunities Program (UROP) Team Grant, August 2019 - May 2020, \$3,000
- Nominated for Haimo Teaching Award, Mathematical Association of America, March 2019
- Burton W. Jones Teaching Award, Rocky Mountain Section of the Mathematical Association of America, March 2018
- Boulder Faculty Assembly Excellence in Teaching and Pedagogy Award, March 2018
- Simons Foundation Collaboration Grant for Mathematicians, September 2017 - August 2022, \$42,000
- University of Colorado Arts & Sciences Fund for Excellence travel award, April 2017, \$1,500
- Nominated for Burton W. Jones teaching award, Rocky Mountain section of the Mathematical Association of America, January 2017

- National Science Foundation grant DMS-1321212 (co-PI), “Conference/Workshop: New Directions in Exterior Differential Systems,” February 2013 - February 2014, \$40,000
- National Science Foundation grant DMS-1206272, “Isometric Embedding and Other Problems in Geometry and Differential Equations,” September 2012 - August 2015, \$165,000
- National Science Foundation grant DMS-0908456, “Topics in the Geometry of Differential Equations,” August 2009 - July 2012, \$90,912
- American Institute of Mathematics SQuaRE (Structured Quartet Research Ensemble) workshop grant, March 2009 - March 2011
- University of Colorado Dean’s Fund for Excellence grant, December 2003
- Residence Life Academic Teaching Award, Department of Housing and the Committee on Learning & Academic Support Services, University of Colorado, Spring 2003
- University of Colorado Junior Faculty Development Award, March 2001
- Awarded membership, Institute for Advanced Study, Princeton, NJ, Fall 1996 - Spring 1998
- National Science Foundation Mathematical Sciences Postdoctoral Research Fellowship, awarded February 1996
- Awarded three Association for Women in Mathematics travel grants: January 1995, July 1996, January 1998
- Graduate student teaching award – Award for demonstrated excellence in teaching from the L.P. and Barbara Smith Endowment, Duke University Department of Mathematics, August 1995 and July 1996
- National Science Foundation Graduate Fellowship, awarded Fall 1991
- Alice T. Schafer Prize, Association for Women in Mathematics, Spring 1991
- Phi Beta Kappa, Spring 1990

## RESEARCH AND CREATIVE WORKS:

### Peer-reviewed articles:

- (1) J. Clelland, D. DeFord, and M. Duchin, “Aftermath: The Ensemble Approach to Political Redistricting,” *Math Horizons* 27 (2020), no. 3, 34-35.
- (2) R.L. Bryant and J.N. Clelland, “Flat metrics with a prescribed derived coframing,” *SIGMA* 16 (2020), 004, 23 pages. Published electronically at <https://www.emis.de/journals/SIGMA/2020/004/>.
- (3) J.N. Clelland and T. Klotz, “Beltrami fields with non-constant proportionality factor via moving frames,” *Arch Rational Mech Anal* (2019), <https://doi.org/10.1007/s00205-019-01481-7>.
- (4) J.N. Clelland, Y. Hu, and M.W. Stackpole, “Dynamic Equivalence of Control Systems and Infinite Permutation Matrices,” *SIGMA* 15 (2019), 063, 16 pages. Published electronically at <https://www.emis.de/journals/SIGMA/2019/063/>.

- (5) J.N. Clelland, T.A. Ivey, N. Tehseen, and P.J. Vassiliou, "Isometric Embedding and Darboux Integrability," *Geometriae Dedicata* 203 (2019), 353-388. Published electronically at <https://doi.org/10.1007/s10711-019-00441-5>.
- (6) J.N. Clelland and T.A. Ivey, "Geometric characterization and classification of Bäcklund transformations of sine-Gordon type," *Journal of Integrable Systems* 3 (2018), 1-44. Published electronically at <https://doi.org/10.1093/integr/xyy018>.
- (7) J.N. Clelland, "A counterexample to Matsumoto's conjecture regarding absolute length vs. relative length in Finsler manifolds," *Reports on Mathematical Physics* 82 (2018), 21-26.
- (8) G.-Q. Chen, J. Clelland, M. Slemrod, D. Wang, and D. Yang, "Isometric embedding via strongly symmetric positive systems," *The Asian Journal of Mathematics* 22 (2018), 1-40.
- (9) N. Bushek and J.N. Clelland, "Geometry of centroaffine surfaces in  $\mathbb{R}^5$ ," *SIGMA* 11 (2015), 001, 24 pages. Published electronically at <http://www.emis.de/journals/SIGMA/2015/001/>.
- (10) J.N. Clelland and J.M. Miller, "A characterization of hyperbolic affine flat, affine minimal surfaces in  $\mathbb{A}^3$ ," *Differential Geometry and Its Applications* 36 (2014) 134-148.
- (11) J. Clelland, E. Estrada, M. May, J. Miller, S. Peneyra, and M. Schmidt, "A Tale of Two Arc Lengths: Metric notions for curves in surfaces in equiaffine space," *Proceedings of the American Mathematical Society* 142 (2014), 2543-2558.
- (12) J.N. Clelland and P.J. Vassiliou, "A Solvable String on a Lorentzian Surface," *Differential Geometry And Its Applications* 33 Suppl. (2014) 177-198.
- (13) B. Carlsen and J.N. Clelland, "The geometry of lightlike surfaces in Minkowski space," *Journal of Geometry and Physics* 74 (2013) 43-55.
- (14) J.N. Clelland, C.G. Moseley, and G.R. Wilkens, "Geometry of optimal control for control-affine systems," *SIGMA* 9 (2013), 034, 31 pages. Published electronically at <http://www.emis.de/journals/SIGMA/2013/034/>.
- (15) J.N. Clelland, "Totally quasi-umbilic timelike surfaces in  $\mathbb{R}^{1,2}$ ," *Asian Journal of Mathematics* 16 (2012) 189-208.
- (16) J.N. Clelland, C.G. Moseley, and G.R. Wilkens, "Geometry of control-affine systems," *SIGMA* 5 (2009), 095, 28 pages. Published electronically at <http://www.emis.de/journals/SIGMA/2009/095/>.
- (17) J.N. Clelland and T.A. Ivey, "Bäcklund transformations and Darboux integrability for nonlinear wave equations," *Asian Journal of Mathematics* 13 (2009) 15-64.
- (18) J.N. Clelland, M. Kossowski, and G.R. Wilkens, "Second-order type-changing evolution equations with first-order intermediate equations," *Journal of Differential Equations* 244 (2008) 242-273.
- (19) J.N. Clelland, M. Kossowski, and G.R. Wilkens, "Constructing topologically distinct energy-critical curves in the path space of the Euclidean line," *Journal of Differential Equations* 241 (2007) 305-331.
- (20) J.N. Clelland, C.G. Moseley, and G.R. Wilkens, "Geometry of sub-Finsler Engel manifolds," *Asian Journal of Mathematics* 11 (2007) 699-726.
- (21) J.N. Clelland and C.G. Moseley, "Sub-Finsler geometry in dimension three," *Differential Geometry And Its Applications* 24 (2006) 628-651.

- (22) J.N. Clelland and T.A. Ivey, “Parametric Bäcklund transformations I: Phenomenology,” *Transactions of the American Mathematical Society* 357 (2005) 1061-1093.
- (23) J.N. Clelland, “Homogeneous Bäcklund transformations of hyperbolic Monge-Ampère systems,” *Asian Journal of Mathematics* 6 (2002) 433-480.
- (24) J.N. Clelland, “A Bäcklund transformation for timelike surfaces of constant mean curvature in  $\mathbb{R}^{1,2}$ ,” *Bäcklund and Darboux Transformations. The Geometry of Solitons*, 141-150, CRM Proc. Lecture Notes 29, American Mathematical Society, Providence, RI, 2001.
- (25) J.N. Clelland, “On the intermediate integral for Monge-Ampère equations,” *Proceedings of the American Mathematical Society* 128 (2000) 527-531.
- (26) J.N. Clelland, “Geometry of conservation laws for a class of parabolic PDEs II: Normal forms for equations with conservation laws,” *Selecta Mathematica (New Series)* 3 (1997) 497-515.
- (27) J.N. Clelland, “Geometry of conservation laws for a class of parabolic partial differential equations,” *Selecta Mathematica (New Series)* 3 (1997) 1-77.
- (28) J.A. Nielsen, “Rewritable sequencings of groups,” *Ars Combinatoria* 36 (1993) 207-214.

**Submitted articles:**

- (29) J.N. Clelland and Y. Hu, “On absolute equivalence and linearization I,” submitted July 2020.
- (30) J. Clelland, H. Colgate, D. DeFord, B. Malmskog, and F. Sancier-Barbosa, “Colorado in Context: Congressional Redistricting and Competing Fairness Criteria in Colorado,” submitted November 2020.

**Peer-reviewed Book:**

- (31) J.N. Clelland, *From Frenet to Cartan: The Method of Moving Frames*, Graduate Studies in Mathematics 178, American Mathematical Society (2017), 414 pp.

**Preprints:**

- (32) J.N. Clelland, T. Klotz, and P.J. Vassiliou, “Cascade Linearization of Invariant Control Systems II: Dynamic Feedback Linearization”
- (33) J.N. Clelland and P.J. Vassiliou, “Strings attached: New light on an old problem”

**Opinion pieces:**

- (34) J.N. Clelland, “Boulder Council elections disfavor minority representation,” Guest Opinion in *The Daily Camera*, January 3, 2020. Available online at <https://www.dailycamera.com/2020/01/03/jeanne-clelland-boulder-council-elections-disfavor-minority-representation/>.
- (35) J.N. Clelland, “The court seeks a standard to measure partisan gerrymandering. Mathematicians came up with one.” Sunday Guest Opinion in *The Daily Camera*, July 7, 2019. Available online at <https://www.dailycamera.com/2019/07/06/opinion-jeanne-clelland-the-court-seeks-a-standard-to-measure-partisan-gerrymandering-mathematicians-came-up-with-one/>.
- (36) J.N. Clelland, “The Mathematics of Gerrymandering and the Supreme Court,” blog post on Mathematical Association of America “Math Values” blog, July 2, 2019. Available online at <https://www.mathvalues.org/masterblog/the-mathematics-of-gerrymandering-and-the-supreme-court>.

### Published software packages:

- (37) Cartan, a software package for Maple to perform computations involving differential forms in general, and to perform Cartan-Kähler analysis of linear Pfaffian exterior differential systems in particular. Available at <http://math.colorado.edu/~jnc/Maple.html>.

### Archived lecture material:

- (38) J.N. Clelland, “Lie groups and the method of moving frames,” lecture notes from invited Summer 1999 Graduate Workshop at the Mathematical Sciences Research Institute, Berkeley, CA, 85 pages, available at <http://math.colorado.edu/~jnc/MSRI.html>. (Streaming videos of the nine workshop lectures available at <http://www.msri.org/publications/video/index2.html>.)

### Works in progress:

- (39) “District compactness in the ReCom sampling method,” joint with Nicholas Bossenbroek, Thomas Heckmaster, Adam Nelson, Peter Rock, and Jade VanAusdall.

## LECTURES AND PRESENTATIONS:

### Invited conference talks:

- (1) “What Can Mathematics Tell Us About Fairness for Redistricting?” Gerrymandering and Congressional Redistricting meeting, sponsored by the Library of Congress Phillip Lee Phillips Map Society and the Rocky Mountain Map Society, January 2021.
- (2) “What Can Mathematics Tell Us About Fairness for Redistricting in Colorado?” Connecting Colorado for Fair Redistricting: A Public Symposium and Call to Action (online), September 2020. Video of talk available online at <https://www.youtube.com/watch?v=xn0ziuy2PI&feature=youtu.be&t=7275>
- (3) “District compactness in the ReCom sampling method,” AMS Spring Southeastern Section Meeting, University of Virginia, March 2020 — CANCELLED due to COVID-19
- (4) “Gerrymandering: What is it, how can we measure it, and what can we do about it?,” plenary talk at SIAM Front Range Applied Mathematics Student Conference, CU-Denver, March 2020
- (5) “Beltrami fields with non-constant proportionality factor via moving frames,” AMS/MAA Joint Mathematics Meetings, Denver, CO, January 2020
- (6) “Isometric embedding via strongly symmetric positive systems,” invited plenary talk at Midwest Geometry Conference, Iowa State University, September 2019
- (7) “Gerrymandering: What is it, how can we measure it, and what can we do about it?,” keynote talk at Rocky Mountain Section meeting of the Mathematical Association of American, Fort Lewis College, Durango, CO, April 2019
- (8) “The Will of the People: How we vote and why it matters,” invited talk at Voting Rights Data Institute, Tufts University, June 2018
- (9) “The Good, the Bad, and the Ugly: The Cartan algorithm for overdetermined PDE systems,” invited semi-plenary talk for session on Symbolic Analysis at the Foundations of Computational Mathematics conference, Barcelona, Spain, July 2017
- (10) “Towards a classification of quasi-linear Bäcklund transformations of wavelike PDEs, and a new example,” AMS Southeastern Section meeting, Charleston, SC, March 2017

- (11) “Beltrami fields with non-constant proportionality factor via moving frames,” AMS Central Section Meeting, Minneapolis, MN, October 2016
- (12) “Isometric embedding via strongly symmetric positive systems,” Conference on PDEs and Free Boundary Problems, University of Pittsburgh, March 2015
- (13) “The geometry of lightlike surfaces in Minkowski space,” SIAM Conference on Applied Algebraic Geometry, Colorado State University, Ft. Collins, CO, August 2013
- (14) “The geometry of lightlike surfaces in Minkowski space,” New Directions in Exterior Differential Systems: a conference in honor of Robert Bryant’s 60th birthday, Estes Park, CO, July 2013
- (15) “Sub-Finsler geometry in dimensions three and four,” Differential Geometry and Continuum Mechanics Workshop, International Centre for Mathematical Sciences, Edinburgh, Scotland, June 2013
- (16) “A Tale of Two Arc Lengths,” AMS Western section meeting, Tucson, AZ, October 2012
- (17) “A Tale of Two Arc Lengths,” Southeast Geometry Conference, College of Charleston, March 2012
- (18) “Equivalence of geometric structures in control theory via moving frames,” Chern Centennial Conference, Mathematical Sciences Research Institute, Berkeley, CA, November 2011
- (19) “Equivalence of geometric structures in control theory via moving frames,” AMS Eastern section meeting, Ithaca, NY, September 2011
- (20) “Equivalence of geometric structures in control theory via moving frames,” plenary talk at the Workshop on Moving Frames in Geometry, Centre de Recherches Mathématiques, Montreal, CA, June 2011
- (21) “Bäcklund transformations and Darboux integrability for nonlinear wave equations,” Texas Geometry and Topology Conference, Texas Tech University, February 2011
- (22) “Totally quasi-umbilic timelike surfaces in  $\mathbb{R}^{1,2}$ ,” AMS central section meeting, St. Paul, MN, April 2010
- (23) “Bäcklund transformations and Darboux integrability for nonlinear wave equations,” Mini Workshop on Differential Systems, Utah State University, November 2009
- (24) “Sub-Finsler geometry in dimensions three and four,” Mini Workshop on Differential Systems, Utah State University, November 2009
- (25) “Geometry of control-affine systems,” AMS southeastern section meeting, Raleigh, NC, April 2009
- (26) “Sub-Finsler geometry in dimensions three and four,” Mathematical Sciences Research Institute Workshop on Exterior Differential Systems and the Method of Equivalence, May 2008
- (27) “Bäcklund transformations and Darboux integrability for nonlinear wave equations,” Lehigh University Geometry and Topology Conference, October 2007
- (28) “Sub-Finsler geometry in dimensions three and four,” 80ème Rencontre entre physiciens théoriciens et mathématiciens: ”Géométrie de Finsler (Mathématiques et Physique),” Institut de Recherche Mathématique Avancée, Strasbourg, France, September 2007.
- (29) “Sub-Finsler geometry in dimensions three and four,” Southeast Geometry Conference, College of Charleston, March 2006

- (30) “Geometry of sub-Finsler Engel manifolds,” AMS central section meeting, Lincoln, NE, October 2005
- (31) “Sub-Finsler geometry in dimension three,” Lehigh University Geometry and Topology Conference, June 2004
- (32) “Sub-Finsler geometry in dimension three,” Southeast Geometry Conference, College of Charleston, March 2003
- (33) “Sub-Finsler geometry in dimension three,” AMS central section meeting, Madison, WI, October 2002
- (34) “Homogeneous Bäcklund transformations of hyperbolic Monge-Ampère systems,” Southeast Geometry Conference, University of Georgia, April 2002
- (35) “Bäcklund transformations of hyperbolic Monge-Ampère equations,” Soliton Equations: Applications and Theory conference, University of Colorado at Colorado Springs, August 2001
- (36) “Bäcklund transformations of hyperbolic Monge-Ampère equations,” Lehigh University Geometry and Topology Conference, June 2001
- (37) “Bäcklund transformations of hyperbolic Monge-Ampère equations,” Southeast Geometry Conference, College of Charleston, March 2000
- (38) “Bäcklund transformations of hyperbolic Monge-Ampère equations,” Robby Fest, a conference in honor of Robert Gardner, University of North Carolina, October 1999
- (39) “Homogeneous Bäcklund transformations of hyperbolic Monge-Ampère equations,” AARMS-CRM Workshop on Bäcklund and Darboux Transformations, June 1999
- (40) “Homogeneous Bäcklund transformations of hyperbolic Monge-Ampère equations,” First Workshop on Formal Geometry and Mathematical Physics, Utah State University, May 1999
- (41) “Some classical results on Bäcklund transformations,” First Workshop on Formal Geometry and Mathematical Physics, Utah State University, May 1999
- (42) “Bäcklund transformations of hyperbolic Monge-Ampère systems,” AWM workshop, Baltimore, MD, January 1998
- (43) “Geometry of conservation laws for parabolic PDEs,” AMS Summer Research Institute on Differential Geometry and Control, University of Colorado, Boulder, July 1997
- (44) “Geometry of conservation laws for parabolic PDEs,” Geometry Festival, Duke University, March 1997
- (45) “Geometry of conservation laws for parabolic PDEs,” Southeast Geometry Conference, University of South Carolina, May 1996

**Invited seminar talks:**

- (46) “Gerrymandering: What is it, how can we measure it, and what can we do about it?,” Applied Math Seminar, Northeastern Illinois University, February 2020
- (47) “Gerrymandering: What is it, how can we measure it, and what can we do about it?,” Institute for Policy Research, Northwestern University, February 2020
- (48) “Isometric embedding via strongly symmetric positive systems,” University of Minnesota, March 2018
- (49) “Isometric embedding via strongly symmetric positive systems,” Wichita State University, March 2018

- (50) “Isometric embedding via strongly symmetric positive systems,” Duke University, June 2015
- (51) “Isometric embedding via strongly symmetric positive systems,” Australian National University, April 2015
- (52) “Isometric embedding via strongly symmetric positive systems,” University of Sydney (Australia) Geometry Seminar, March 2015
- (53) “Isometric embedding via strongly symmetric positive systems,” Texas A&M University, February 2015
- (54) “Equivalence of geometric structures in control theory via moving frames,” Australian National University, November 2012
- (55) “Equivalence of geometric structures in control theory via moving frames,” Universidade de Brasilia, June 2012
- (56) “Bäcklund transformations and Darboux integrability for nonlinear wave equations,” Texas A&M University, November 2009
- (57) “Constructing topologically distinct energy-critical curves in the path space of the Euclidean line,” University of Wisconsin, February 2009
- (58) “Sub-Finsler geometry in dimensions three and four,” Duke University, October 2006
- (59) “Conservation laws for second-order evolution equations,” Kansas State University, April 2006
- (60) “Sub-Finsler geometry,” Colorado State University, January 2005
- (61) “Sub-Finsler geometry in dimension three,” University of Colorado, Colorado Springs, April 2003
- (62) “Bäcklund transformations of hyperbolic Monge-Ampère equations,” Department of Applied Mathematics Dynamics seminar, University of Colorado, February 2002
- (63) “Bäcklund transformations of hyperbolic Monge-Ampère equations,” University of Chicago, October 2001

**Invited colloquium talks:**

- (64) “A Tale of Two Arc Lengths,” Australian National University, November 2012
- (65) “A Tale of Two Arc Lengths,” Instituto de Matematica, Universidade Federal do Rio de Janeiro, June 2012
- (66) “Classical results on Bäcklund transformations,” Texas A&M University, November 2009
- (67) “PDEs for geometers and vice-versa: Intro to exterior differential systems,” Wake Forest University, April 2009
- (68) “PDEs for geometers and vice-versa: An introduction to exterior differential systems,” Wesleyan University, March 2008
- (69) “PDEs for geometers and vice-versa: An introduction to exterior differential systems,” Kansas State University, April 2006
- (70) “PDEs for geometers: Introduction to exterior differential systems,” Lehigh University, December 1996
- (71) “PDEs for geometers: Introduction to exterior differential systems,” University of Georgia, November 1996



**Invited talks for students:**

- (72) “The Will of the People: How we vote and why it matters,” CU-Boulder math club, April 2019
- (73) “The Will of the People: How we vote and why it matters,” Fairview High School math club, January 2019
- (74) “The Poincaré conjecture in dimension 2, or why topologists can’t tell their donuts from their cups of coffee,” Wake Forest University, March 2017
- (75) “The Poincaré conjecture in dimension 2, or why topologists can’t tell their donuts from their cups of coffee,” Calvin College Math Club, October 2010
- (76) “The Poincaré conjecture in dimension 2, or why topologists can’t tell their donuts from their cups of coffee,” Wesleyan University Math Club, March 2008
- (77) “The Poincaré conjecture in dimension 2, or why topologists can’t tell their donuts from their cups of coffee,” Duke Math Alumni Lecture Series, Duke University, October 2006

**Public lectures:**

- (78) “Math vs. Gerrymandering: Using math to work for fair maps in Colorado and everywhere,” joint talk with Beth Malmskog, Free and Equal Elections Foundation Annual Electoral Reform Symposium, Denver, CO, Dec. 7, 2019. Video of the entire symposium available at <https://www.youtube.com/embed/FDZYPhGkK-4>; talk starts at 33-minute mark.
- (79) “The Will of the People: How we vote and why it matters,” League of Women Voters of Boulder County Community Conversation, November 10, 2019. Video of the talk available at <https://www.youtube.com/watch?v=nK34leqGbLs&feature=youtu.be>.
- (80) “POINCARÉ WAS RIGHT: If it looks like a sphere and quacks like a sphere, then it IS a sphere! (So why is this worth a Fields Medal?),” Math Awareness Month Lecture, University of Colorado, April 2007

**Podcasts:**

- (81) Featured guest on “My Favorite Theorem” podcast, Episode 11, January 2018. Podcast and accompanying Scientific American blog post available at <https://blogs.scientificamerican.com/roots-of-unity/jeanne-clellands-favorite-theorem/>

**Posters:**

- (82) “Conservation laws for parabolic PDEs,” Julia Robinson Celebration of Women in Mathematics, Mathematical Sciences Research Institute, July 1996
- (83) “Exterior differential systems and conservation laws for partial differential equations,” AWM workshop, San Francisco, CA, January 1995

**TEACHING EXPERIENCE AND ACCOMPLISHMENTS:****Invited lecture series:**

- “Lie groups and Cartan’s method of moving frames,” mini-course of six lectures, Universidade de Brasilia, June 2012
- “Lie groups and the method of moving frames,” invited series of nine lectures, Summer Graduate Workshop at the Mathematical Sciences Research Institute, Berkeley, CA, July 1999

**Postdoctoral fellows supervised:**

- Yuhao Hu, Fall 2018 - Spring 2020
- Sunita Vatuk, Fall 2009 - Spring 2010

**Ph.D. students supervised:**

- Peter Rock, Ph.D. student 2019 - present
- Boramey Chhay, Ph.D. student (secondary advisor) 2015 - 2016
- Pearce Washabaugh, Ph.D. student (secondary advisor) 2015 - 2016
- Mason Pelfrey, Ph.D. student 2014 - 2017
- Taylor Klotz, Ph.D. student 2015 - 2020 – Ph.D. received August 2020  
Dissertation: *Geometry of Cascade Feedback Linearizable Control Systems*
- Matthew Stackpole, Ph.D. student 2008 - 2011 – Ph.D. received May 2011  
Dissertation: *Dynamic equivalence of control systems via infinite prolongations*
- Christopher Catone, Ph.D. student 2000 - 2006 – Ph.D. received August 2006  
Dissertation: *Projective equivalence of Finsler and Riemannian surfaces*

**M.A./M.S. students supervised:**

- Brendt Gerics, M.A. student 2017 - 2018 – M.A. received May 2018
- Rachel Benefiel, M.A. student 2016 - 2017 – M.A. received May 2017
- Jessica Burkhart, M.A. student 2012 – M.A. received August 2012
- Nathaniel Bushek, M.A. student 2009 - 2010 – M.A. received May 2010
- Jason Boisvert, M.S. student 2005 - 2006 – M.S. received December 2006
- Anne Cervino, M.A. student 2002 – M.A. received May 2002

**Undergraduate research projects supervised:**

- Nicholas Bossenbroek, Thomas Heckmaster, Adam Nelson, and Jade VanAusdall, Undergraduate Research Opportunities Program (UROP) project on Mathematical Analysis of Legislative Redistricting in Colorado, Fall 2019.
- Nicholas Bossenbroek, Thomas Heckmaster, Adam Nelson, and Jade VanAusdall, 6 week summer REU project on Discrete Geometry and Applications to Redistricting, Summer 2019.

**Undergraduate honors theses supervised:**

- Peter Rock, *Uses of Mathematics in Computer Animation and 3D Rendering Software*, *summa cum laude* honors, Spring 2018
- Jonah Miller, *A characterization of affine minimal and affine flat surfaces*, *summa cum laude* honors, Spring 2013
- Brian Carlsen, *The Geometry of Null Surfaces in Minkowski Space*, *summa cum laude* honors, Spring 2012

**Independent study courses supervised:**

- James Stephan (undergraduate), Lie groups and Cartan's method of moving frames, Spring 2018
- Peter Rock and James Stephan (undergraduates), Lie groups and Cartan's method of moving frames, Fall 2017
- Brendt Gerics (M.A. student), Lie groups and Cartan's method of moving frames, Spring 2017
- Duff Baker-Jarvis, Akaxia Cruz, Rachel Helm, Peter Joeris, and Joshua Karpel (undergraduates), Lie groups and Cartan's method of moving frames, Spring 2013
- Edward Estrada, Molly May, and Jonah Miller (undergraduates), Lie groups and Cartan's method of moving frames, Part 2, Spring 2012
- Edward Estrada, Molly May, Jonah Miller, and Sean Peneyra (undergraduates), Lie groups and Cartan's method of moving frames, Fall 2011
- Brian Carlsen (undergraduate) and Michael Schmidt (M.A. student), Lie groups and Cartan's method of moving frames, Fall 2010
- Bryan Kaufman (undergraduate) and Nathaniel Bushek (M.A. student), Lie groups and Cartan's method of moving frames, Fall 2009
- Sam Galler (Boulder High School student), Geometry of Curves and Surfaces, Spring 2007

**New courses developed:**

- FYSM 1000: First-Year Seminar: "How Not To Be Wrong"
- MATH 4230/5230: Differential Geometry of Curves and Surfaces
- MATH 4810/5810: Special Topics in Mathematics: Mathematics of Redistricting

**Courses taught:**

- Professor of Mathematics, University of Colorado:
  - FYSM 1000-040: First-Year Seminar: "How Not To Be Wrong" – Fall 2017
  - MATH 2001: Introduction to Discrete Math – Spring 2019, Fall 2019
  - MATH 3430: Ordinary Differential Equations – Spring 2018, Fall 2019
  - MATH 4230/5230: Differential Geometry of Curves and Surfaces – Fall 2014, Fall 2016, Fall 2018, Fall 2020
  - MATH 4470/5470: Introduction to Partial Differential Equations – Spring 2016, Spring 2020, Spring 2021
  - MATH 4810/5810: Special Topics in Mathematics: Mathematics of Redistricting – Fall 2020
  - MATH 6230: Introduction to Differential Geometry I – Spring 2016, Spring 2018, Spring 2019
  - MATH 6240: Introduction to Differential Geometry II – Fall 2015
- Associate Professor of Mathematics, University of Colorado:
  - MATH 2001: Introduction to Discrete Math – Spring 2010, Fall 2011
  - MATH 2400: Calculus III – Fall 2012
  - MATH 3130: Introduction to Linear Algebra – Spring 2009, Spring 2011

- MATH 4200: Introduction to Topology – Spring 2011, Spring 2014
- MATH 4230: Geometry of Curves and Surfaces – Fall 2008, Fall 2009, Fall 2010, Fall 2012
- MATH 4430: Ordinary Differential Equations – Spring 2010
- MATH 4470: Introduction to Partial Differential Equations – Fall 2008, Spring 2012
- MATH 5470: Introduction to Partial Differential Equations – Spring 2012
- MATH 6230: Introduction to Differential Geometry I – Spring 2014
- Assistant Professor of Mathematics, University of Colorado:
  - MATH 1300: Calculus I – Spring 1999, Fall 2005
  - MATH 2300: Calculus II – Spring 2000
  - MATH 2420: Honors Calculus III – Fall 2001
  - MATH 3200: Introduction to Topology – Spring 2003
  - MATH 4230: Geometry of Curves and Surfaces – Spring 2001, Spring 2003, Spring 2005, Spring 2007
  - MATH 4430: Ordinary Differential Equations – Fall 1998, Fall 1999, Spring 2002 (2 sections), Fall 2002, Spring 2006 (2 sections), Spring 2007
  - MATH 6230: Introduction to Differential Geometry I – Fall 2006
  - MATH 6240: Introduction to Differential Geometry II – Spring 1999, Spring 2001, Spring 2005
  - MATH 6350: Complex Variables I – Fall 1999, Fall 2002
  - MATH 6360: Complex Variables II (Introduction to Algebraic Curves) – Spring 2000
- Instructor, Duke University:
  - Introductory Calculus II – Fall 1994, Fall 1995
  - Introductory Calculus III – Spring 1995
- Teaching Assistant, Duke University Talent Identification Program:
  - Taught Algebra I to gifted 7th grade students – Summer 1988

## **SERVICE AND OUTREACH ACTIVITIES:**

### **Service to the Department of Mathematics, University of Colorado:**

- Chair, Primary Unit Evaluation Committee for Assistant Professor Magdalena Czubak's Tenure and Promotion to Associate Professor, Fall 2019
- Chair, Primary Unit Evaluation Committee for Assistant Professor Magdalena Czubak's Comprehensive Review, Fall 2017
- Chair, Primary Unit Evaluation Committee for Instructor Faan Tone Liu's Reappointment and Promotion to Senior Instructor, Fall 2017
- Associate Chair for Undergraduate Studies, Fall 2012 - Spring 2017 (on sabbatical Spring 2015)
- Faculty mentor to Magdalena Czubak, Fall 2016 - present
- Faculty mentor to Anca Radalescu, Fall 2010 - Spring 2014
- Department representative to Mathematical Sciences Research Institute Sponsors Day, March 2013
- Faculty Course Supervisor (a.k.a. "Calc Czar") for MATH 1300 (Calculus I), Fall 2005
- Kempner Colloquium chair, Fall 1999 - Spring 2000

- Hiring committees:
  - Chair, Stochastic and deterministic differential equations faculty hiring committee, Fall 2019
  - Chair, Differential geometry faculty hiring committee, Fall 2015 - Spring 2016
  - Chair, Calc czar hiring committee, Spring 2013
  - Member, IT staff position hiring committee, Spring 2013
  - Member, Analysis faculty hiring committee, Fall 2012 - Spring 2013
  - Member, Geometry faculty hiring committee, Fall 2011 - Spring 2012
  - Member, IT staff position hiring committee, Fall 2011 - Spring 2012
  - Member, Differential equations faculty hiring committee, Spring 2006
  - Member, Algebra faculty hiring committee, Spring 2003
  - Member, Analysis faculty hiring committee, Spring 2002
  - Member, Algebraic topology faculty hiring committee, Spring 2000
- Graduate exam committees:
  - Member, Geometry/topology preliminary exam committee, January 2020
  - Member, Geometry/topology preliminary exam committee, August 2018
  - Member, Geometry/topology preliminary exam committee, January 2018
  - Member, Geometry/topology preliminary exam committee, August 2016
  - Member, Geometry/topology preliminary exam committee, August 2014
  - Member, Geometry/topology preliminary exam committee, January 2013
  - Member, Geometry/topology preliminary exam committee, January 2012
  - Member, Analysis preliminary exam committee, August 2001
  - Member, Algebra preliminary exam committee, January 1999
  - Member, Masters degree exam committee for Rebecca Wilczak, April 2012
  - Member, Masters degree exam committee for Ivyl Boyce, July 2006
  - Member, Masters degree exam committee for Daniel Champion, May 2005
  - Member, Masters degree exam committee for Catherine Moody, April 2004
  - Member, Masters degree exam committee for Lynn Schooley, April 2000
  - Member, Masters degree exam committee for Kimberly Wey, April 2000
  - Member, Masters degree exam committee for Keri Kornelson, November 1999
  - Member, Qualifying exam committee for Zachary Gray (Department of Computer Science), March 2019
  - Member, Qualifying exam committee for Albany Thompson, September 2018
  - Member, Qualifying exam committee for Braden Balentine, December 2017
  - Member, Qualifying exam committee for Carlos Pinilla, May 2016
  - Member, Qualifying exam committee for Jonathan Belcher, November 2015
  - Member, Qualifying exam committee for Jae Min Lee, September 2015
  - Member, Qualifying exam committee for Boramey Chhay, April 2014
  - Member, Qualifying exam committee for Pearce Washabaugh, January 2014
  - Member, Qualifying exam committee for Chao Ma, October 2010
  - Member, Qualifying exam committee for Christopher Seaton, November 2001
  - Member, Ph.D. thesis exam committee for Zachary Gray (Department of Computer Science), October 2019

- Member, Ph.D. thesis exam committee for Pearce Washabaugh, March 2017
- Member, Ph.D. thesis exam committee and second reader for Matthew Krupa, July 2016
- Member, Ph.D. thesis exam committee for John Davenport, October 2007
- Member, Ph.D. thesis exam committee for Christopher Brown, November 2004
- Member, Ph.D. thesis exam committee for William Kirwin, March 2004
- Other departmental committees:
  - Member, Primary Unit Evaluation Committee for Nathaniel Thiem's promotion to Full Professor, Fall 2020
  - Member, Primary Unit Evaluation Committee for Sean O'Rourke's tenure and promotion, Fall 2020
  - Member, Awards Committee, Fall 2018 - Fall 2020
  - Member, First-Year Mathematics Committee, Fall 2018 - Spring 2019
  - Member, Primary Unit Review Committee for Sean O'Rourke's reappointment, Fall 2018
  - Member, Teaching Quality Framework committee, Fall 2017 - Spring 2018
  - Member, Executive Committee, Fall 2011 and Fall 2013 - present
  - Chair, Task Force on Reappointment, Promotion, and Tenure, Fall 2010 - Spring 2012
  - Member, Task Force on Reappointment, Promotion, and Tenure, Fall 2007 - Fall 2008
  - Member, Primary Unit Review Committee for Stephen Preston's tenure and promotion, Fall 2012
  - Member, Primary Unit Review Committee for Stephen Preston's reappointment, Fall 2009
  - Member, Computer Committee, Fall 2008 - Fall 2012
  - Member, Graduate Committee, Fall 2008 - Spring 2010
  - Member, Undergraduate committee, 1998 - 2005
  - Member, Math 350 redecoration committee, Spring 2008

**Service/Outreach Activities for the University of Colorado:**

- Campus sponsor for The Center for Bright Kids Summer Programs, January 2019 - present
- Member, Academic Affairs Advisory Committee, Fall 2017 - present
- Gave an interview to U.S. News & World Reports on how incoming freshmen planning to major in math can prepare over the summer, June 2014:  
<http://www.usnews.com/education/best-colleges/articles/2014/06/23/get-a-jump-start-on-college-classes-as-a-stem-major>
- Member, Academic Advising Center promotional committee, Fall 2012
- University of Colorado Representative, Rocky Mountain Mathematics Consortium Board of Directors Meeting, New Orleans, LA, January 2007
- Volunteered for Girl Scout Badge Day, sponsored by the Women In Engineering Program at the University of Colorado, October 2006

- Co-organized Department of Mathematics public lecture “Real Estate in Hyperbolic Space: Investment Opportunities for the New Millennium” by Dr. Colin Adams of Williams College, April 2006
- Member, Appeals Committee on Academic Rules and Policies, Fall 2005 - Spring 2006
- Math consultant for “Breaking the Code,” a production of the University of Colorado Department of Theater and Dance, October 2005
- Co-organized Department of Mathematics public lecture “Soap Bubbles and Mathematics” by Dr. Frank Morgan of Williams College, April 2004
- Co-organized Department of Mathematics public lecture “Mathemagics” by Dr. Arthur Benjamin of Harvey Mudd College, March 2002
- Consultation regarding a Mathematica computation for Patrick Weidman, University of Colorado Department of Mechanical Engineering, October 2002
- Gave a presentation on utilizing university resources at a CRCW panel discussion, October 2001
- Gave a math presentation for a Brownie troop, November 2000

**Service to the National Science Foundation:**

- Member, Grant review panel, February 2014, February 2016
- Member, Division of Mathematical Sciences Committee of Visitors, February 2013

**Service to the American Mathematical Society:**

- Chair, Western Section Program Committee, 2018
- Member, Western Section Program Committee, 2017

**Service to the Association for Women in Mathematics:**

- Schafer Prize committee, 1999 - 2001 (committee chair in 2000 and 2001)

**Conferences/Special sessions co-organized:**

- Co-organized special session on “Geometry of Differential Equations” for American Mathematical Society/Mathematical Association of America Joint Meetings, Denver, CO, January 2020
- Co-organized Geometry and Analysis Day, University of Colorado, October 2018
- Co-organized working group in Calibrated Geometry at Women in Geometry conference, Banff International Research Station, Banff, Canada, November 2015
- Co-organized “New Directions in Exterior Differential Systems: a conference in honor of Robert Bryant’s 60th birthday,” Estes Park, CO, July 2013
- Co-organized Mathematical Sciences Research Institute Workshop on Exterior Differential Systems and the Method of Equivalence in honor of Robert B. Gardner, May 2008
- Co-organized Association for Women in Mathematics workshop at the American Mathematical Society/Mathematical Association of America Joint Mathematics Meetings, New Orleans, LA, January 2007
- Co-organized special session on “Geometry of Differential Equations” for American Mathematical Society Fall Central Section meeting, Lincoln, NE, October 2005

- Co-organized special session on “Geometry of Partial Differential Equations” for American Mathematical Society Fall Central/Western Joint Section meeting, Boulder, CO, October 2003

**Manuscripts refereed/reviewed:**

- Referee for:
  - **2020:** *The Hokkaido Mathematical Journal, Journal of Geometry and Physics, Journal of Differential Equations, Journal of Mathematical Analysis and Applications*
  - **2019:** *Journal of Nonlinear Mathematical Physics*
  - **2018:** *Applied Mathematics and Computation, Communications in Analysis and Geometry, The Hokkaido Mathematical Journal, International Journal of Geometric Methods in Modern Physics, Journal of Geometric Analysis, Linear Algebra And Its Applications, Reports on Mathematical Physics*
  - **2017:** *Geometriae Dedicata, Differential Geometry and its Applications, Journal of Geometric Analysis*
  - **2016:** *Applied Mathematics and Computation, Journal of Geometry and Physics*
  - **2015:** *Communications in Analysis and Geometry, Proceedings of the Royal Society of Edinburgh, Series A*
  - **2014:** *Communications in Analysis and Geometry, Differential Geometry And Its Applications, ICMS Proceedings volume on “Differential Geometry and Continuum Mechanics,” Journal of Differential Equations, Journal of Nonlinear Science, SIGMA (Symmetry, Integrability, and Geometry: Methods and Applications)*
  - **2013:** *Brazilian Journal of Physics, Canadian Mathematical Bulletin, Differential Geometry and its Applications, Journal of Geometry and Physics, Journal of Mathematical Analysis and Applications, Mathematical Communications*
  - **2012:** *Differential Geometry and its Applications, Journal of Geometry and Physics, Journal of Mathematical Analysis and Applications, Letters in Mathematical Physics, Mathematical Communications, SIGMA (Symmetry, Integrability, and Geometry: Methods and Applications)*
  - **2010:** *Mathematical Communications, Journal of Geometry and Physics, Journal of Mathematical Analysis and Applications, Osaka Journal of Mathematics*
  - **2009:** *Communications in Analysis and Geometry, Duke Mathematical Journal, Journal of Lie Theory*
  - **2008:** *Advances in Mathematics, Differential Geometry and its Applications, Journal of Lie Theory*
  - **2007:** *Duke Mathematical Journal*
  - **2006:** *Foundations of Computational Mathematics, Journal of Mathematical Analysis and Applications, Journal of Zhejiang University Science*
  - **2005:** *Journal of Differential Equations*
  - **2003:** *Proceedings of the American Mathematical Society, Transactions of the American Mathematical Society*
  - **2002:** *Canadian Journal of Mathematics, Journal of Differential Equations*
  - **1999:** *Transactions of the American Mathematical Society*
  - **1998:** *Differential Geometry and Control, Proceedings of Symposia in Pure Mathematics*



- Reviewer for *zbMATH*, May 2018 - present
- Reviewer for *Mathematical Reviews*, January 2016 - present
- Reviewer for *Zentralblatt*, January 2013 - September 2014

**Grant proposals reviewed:**

- Reviewer for Banff International Research Station workshop proposal, November 2017
- Reviewer for Natural Sciences and Engineering Research Council of Canada grant proposal, December 2010
- Reviewer for National Science Foundation grant proposals, January 2001, July 2013

**External Ph.D. theses reviewed:**

- External Reviewer for Ph.D. thesis of Sara Froehlich, McGill University, November 2016
- External Reviewer for Ph.D. thesis of Sunita Vatak, Princeton University, July 2009
- External Reviewer for Ph.D. thesis of Dennis The, McGill University, July 2008

**Miscellaneous outreach activities:**

- Gave an interview about Project NExT for Science's NextWave, Science magazine's career-oriented online publication, March 1999

**PROFESSIONAL DEVELOPMENT ACTIVITIES:**

- Leadership Education for Advancement and Promotion (LEAP) workshop participant, 2005
- Project NExT (New Experiences in Teaching) fellow, Mathematical Association of America, 1998-2000
- Area Teaching Scholars Program participant, University of Colorado, 1998-1999
- Teaching workshop participant, Princeton University Department of Mathematics, January 1998

**PROFESSIONAL AFFILIATIONS:**

- American Mathematical Society (AMS)
- Mathematical Association of America (MAA)
- Association for Women in Mathematics (AWM)
- Metric Geometry and Gerrymandering Group (MGGG)