

Dylan McKnight

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Department of Mathematics and Statistics
Colorado Mesa University
Wubben Hall 134C
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Research Interests

- Partial Differential Equations, Fluid Mechanics, Fluid Structure Interaction, Control Theory, Numerical Analysis, Finite Element Method

Education

- **University of Nebraska-Lincoln** Lincoln, NE
Ph.D. in Mathematics Aug. 2017 - Aug 2024
 - Thesis Advisors: George Avalos & Mohammad Rammaha
 - Thesis Title: *Gevrey Class and Time-Dependent Finite Element Analysis of a Fluid Structure Interaction System*
- **University of Nebraska-Lincoln** Lincoln, NE
M.S. in Mathematics Aug. 2017 - May 2019
- **Saginaw Valley State University** University Center, MI
B.S. in Mathematics, B.S. in Physics; Magna Cum Laude Aug. 2012 - May 2017

Positions Held

- **Colorado Mesa University** Grand Junction, CO
Assistant Professor of Mathematics Aug. 2024 - Current; 40 hours per week
 - Courses Taught: Methods of Applied Mathematics III, College Algebra
- **University of Nebraska-Lincoln** Lincoln, NE
Graduate Teaching Assistant Aug. 2017 - Aug. 2024; 20 hours per week
 - Course Coordinator: Trigonometry
 - Nebraska Math and Science Summer Institutes GTA: Discrete Mathematics for Teachers
 - Instructor of Record: Calculus I, Calculus II, Ordinary Differential Equations, College Algebra & Trigonometry, Contemporary Mathematics, Trigonometry, College Algebra
- **University of Nebraska-Lincoln** Lincoln, NE
Graduate Research Assistant (Funded by NSF Grants 1907823, 1616425) Five Summers; 20 hours per week
 - May 2023 - Aug. 2023: Time-dependent finite element analysis of fluid-structure interaction systems
 - May 2022 - Aug. 2022: Exact Null Controllability of fluid-structure interaction systems
 - May 2021 - Aug. 2021: Investigating analytic semigroup generation for fluid-structure interaction and thermoelastic systems
 - May 2020 - Aug. 2020: Multi-dimensional finite element methods for stationary fluid structure systems and vector valued Poisson problems
 - May 2019 - Aug. 2019: Finite element methods and elliptic boundary value problems
- **Saginaw Valley State University** University Center, MI
Math & Physics Resource Center Tutor Aug. 2013 - July 2017; 10 hours per week
 - Tutored students in math, physics, statistics, and usage of Maple and Minitab for these subjects

Skills

Programming experience in: MATLAB, Octave, R (tidyverse), Python, HTML, Visual Basic

Typesetting Languages: \LaTeX ,

Software: Git, ABAQUS, Gmsh, RStudio, Webwork, Maple, Minitab, SageMath, LabVIEW, Visual Studio, Microsoft Office

Papers in Progress

- George Avalos, Dylan McKnight, Sara McKnight *Gevrey Regularity for a Fluid-Structure Interaction Model*
- Dylan McKnight *Time Dependent Numerics for a Fluid Structure Interaction Model*
- George Avalos, Dylan McKnight *Constructive Steering Controls for Stokes Flow*

Grants & Graduate Awards

- Graduate Student Travel Grant (\$500): Fall 2023, Spring 2024 University of Nebraska-Lincoln
 - Grant awarded to advanced graduate students supporting travel directly related to their dissertation work.
- Emeritus Faculty Fellowship (\$750): 2020, University of Nebraska-Lincoln
 - Awarded for graduate student research. Nominated by faculty.

Internal Leadership, Mentoring, & Service

- Second Year Mathematics Task Force Member: Fall 2023, University of Nebraska - Lincoln (UNL)
 - Committee aimed at supporting second year mathematics courses (calculus III, differential equations, linear algebra). Creates, implements, and analyzes the efficacy of syllabi and materials changes.
- Directed Reading Program Mentor: Spring 2021, Spring 2023, Fall 2023, UNL
 - Mentored undergraduate math students through topics outside UNL's undergraduate math curriculum.
- Academic Program Review Graduate Student Liaison: Fall 2022, UNL
 - Coordinated and facilitated meeting between graduate students and APR team.
- Great Plains Alliance Volunteer: Seven Semesters
 - Connects UNL math graduate students with smaller universities in the region. Volunteers give accessible talks and answer questions about graduate school experiences.
- Math Day Volunteer: Seven Years (2017-2023) UNL
 - Annual event aimed at fostering interest in mathematics and STEM-based careers among roughly 1000 Nebraska high school students.
- Graduate Student Mentoring Program Coordinator: 2021-2022, UNL
 - Program aimed at connecting first year math graduate students with senior grad students to ease graduate life transition and promote success. Paired mentors and first years based on personal interactions, and emphasized critical times (e.g. exams, first assignments) for mentors to check on first years.
- Graduate Student Mentoring Program Mentor: 2019-2020, 2020-2021, 2023-2024 UNL
- Nebraska Conference for Undergraduate Women in Mathematics Volunteer: 2018, 2019, 2020, 2021, 2023 UNL
 - Conference aimed at promoting success and engagement in mathematics research and graduate study.
- Seminar Organization, UNL
 - Numerical Analysis Reading & Writing Languages Seminar: Fall 2023 - present
 - Student Applied Analysis Reading Seminar: Fall 2019 - Spring 2023
 - Students in Partial Differential Equations Reading Seminar: Fall 2019 - Spring 2021
 - Graduate Student Seminar: Fall 2018 - Spring 2019

External Service

- The 8th Annual Meeting of the SIAM Central States Section, Conference Co-Organizer

- Consortium for Mathematics and Its Applications (COMAP) Interdisciplinary Contest in Modeling Judge: 2020, 2021, 2023
- COMAP Mathematical Contest in Modeling Judge: 2020, 2022

External Talks & Presentations

(*) Invited presentations

16. (*) AMS 2024 Spring Central Sectional Meeting Special Session on Recent Advances in Nonlinear PDEs and Their Applications, April 21, 2024: “Constructive Steering Controls for Stokes Flow”
15. Wayne State College Math Club (Great Plains Alliance), November 7, 2023: “Euler’s Method and Numerical Differential Equations”
14. (*) The 8th Annual Meeting of SIAM Central States Section, October 7, 2023, University of Nebraska-Lincoln: “Time Dependent Finite Elements for a Fluid-Structure Interaction System,” 20 minutes
13. (*) University of Maryland, Baltimore County Applied Mathematics Colloquium, September 29, 2023: “Semigroup Methods for PDE Systems Modelling Fluid-Structure Interaction,” 50 minutes
12. 7th KUMUNU-ISU Conference in PDE, Dynamical Systems and Applications, Iowa State University, April 22, 2023: “Regularity Results and Finite Element Analysis for a Problem Arising from Fluid Structure Interaction,” Poster
11. Dordt University Mathematics Colloquium (Great Plains Alliance), December 2, 2022: “Two Dimensional Dynamical Systems with the Matrix Exponential,” 30 minutes
10. Mathematical and Applied Analysis Seminar, University of Arkansas, September 15, 2022: “Semigroup Wellposedness and Gevrey Class Estimates for a Heat Structure Interaction Model,” 50 minutes
9. MSRI-NCTS Joint Summer School: Recent Topic in Well Posedness, University of Hawaii-Hilo, July 28, 2022: “Gevrey Class for a Fluid Structure Interaction Model,” 15 minutes
8. Saginaw Valley Math Club, Saginaw Valley State University, University Center, MI, October 19, 2021: “The Weak Derivative and Modern Differential Equation Theory,” 45 minutes
7. Dordt University Mathematics Colloquium (Great Plains Alliance), April 9, 2021: “Straight to the Point with Calculus of Variations,” 30 minutes
6. Benedictine College (Great Plains Alliance), February 21, 2020: “Euclid’s Fifth Postulate & Non-Euclidean Geometry,” 30 minutes
5. (*) SVSU Fall 2016 SE&T Colloquium Series, Saginaw Valley State University, University Center, MI, October 18, 2016: “Exploring Elliptic Curves Using Maple,” 50 minutes
4. MAA Mathfest, Columbus, OH, August 4, 2016: “Exploring Elliptic Curves Using Maple”
3. Summer Undergraduate Michigan Mathematics Research Conference (SUMMR), University of Michigan-Dearborn, Dearborn, MI, July 15, 2016: “Exploring Elliptic Curves Using Maple,” 15 minutes
2. Kansas State University REU Poster Session, July 20, 2015: “Students’ Understanding of Taylor Series in Electricity and Magnetism,” Poster
1. Kansas State University Physics REU Final Presentation, July 23, 2015: “Mathematization: Student Resource Use in E&M I,” 30 minutes

Local Presentations

- **PDE & Applied Analysis Seminar**, University of Nebraska - Lincoln, 50 minutes

14. "Fluid-Structure Systems and Time Dependent Finite Element Analysis," October 12, 2023
13. "Gevrey Class Estimates of Two Fluid Structure Interaction Models," October 26, 2022
12. "Serrin's Uniqueness Condition for Weak Solutions of Navier-Stokes," February 1, 2022
11. "Well-posedness of a Compressible Flow Structure Model," November 16, 2021
10. "Analyticity of Semigroup Solutions of a Thermoelastic Plate System," March 16, 2021
9. "Local Existence of Solutions of an FSI Model with Bad Sign," October 20, 2020
8. "Well-Posedness of Pressure in a Fluid Structure Interaction Model Part II," March 10, 2020
7. "Well-Posedness of Pressure in a Fluid Structure Interaction Model Part I," March 3, 2020
6. "Technical Questions Frequently Asked by Graduate Students Part 4," March 11, 2019
5. "Technical Questions Frequently Asked by Graduate Students Part 3," March 4, 2019
4. "Further Preliminaries and Proof of the Theorem of Chueshov and Lasiecka," November 13, 2018
3. "Necessary Conditions of Dynamical Systems to Attain Global Attractors," November 6, 2018
2. "Stochastic Differential Equations and Fokker-Plack Equations," September 18, 2018
1. "An Introduction to Brownian Motion and White Noise," September 11, 2018

- **Student Applied Analysis Reading Seminar**, University of Nebraska - Lincoln, 50 minutes

15. "The Hankel Transform and Spherical Harmonics," April 18, 2023
14. "Getting From A to B with Mathematical Control Theory," January 31, 2023
13. "Functional Analysis and the Galerkin Method," November 15, 2022
12. "Strongly Continuous Semigroups for Linear Partial Differential Equations," September 6, 2022
11. "A Counterexample for Differentiability of a Perturbed Semigroup," April 27, 2022
10. "Perturbation Theory for Semigroup Solutions of Evolution Equations," April 20, 2022
9. "An Alternative Criterion for Analytic Semigroup Generation," February 8, 2022
8. "Escaping the Annulus: Stochastic Solutions of Laplace's Equation," March 29, 2021
7. "Semigroup Solutions of PDEs and the Lumer-Phillips Theorem," November 4, 2020
6. "Weak Derivatives & Modern PDE Theory," September 16, 2020
5. "Bochner Space Theory Part II: Some Weak* Convergence Results," February 5, 2020
4. "Bochner Space Theory Part I: The Bochner Integral," January 29, 2020
3. "Mathematical Foundations of Quantum Mechanics," November 13, 2019
2. "Fractional Sobolev Spaces Part II: The Fractional Laplacian," September 18, 2019
1. "Fractional Sobolev Spaces Part I: Preliminaries," September 4, 2019

- **Graduate Student Seminar**, University of Nebraska - Lincoln, 50 minutes (unless stated otherwise)

4. "Making Differential Equations Algebra with Finite Element Method," March 27, 2023
3. "Straight to the Point with Calculus of Variations," August 30, 2021
2. "Weak Derivatives & Modern PDE Theory," September 28, 2020
1. "Groups of Elliptic Curves over $\mathbb{Z}/p\mathbb{Z}$," April 23, 2020, 15 minutes

Other Conferences & Workshops Attended

6. "8th Annual KUMUNU-ISU PDE, Dynamical Systems and Applications Conference," University of Kansas, April 6-7, 2024
5. "6th Annual SIAM Central States Section Conference," University of Kansas (Virtual), October 2-3, 2021

4. "Recent Developments in Fluid Dynamics," MSRI (Virtual), April 12-30, 2021, Workshop
3. "5th Annual SIAM Central States Section Conference," Iowa State University, October 19-20, 2019
2. "KUMUNU Conference on PDE, Dynamical Systems, and Applications," University of Missouri, April 27-28, 2019
1. "2017 Michigan MAA Section Annual Meeting," Ferris State University, March 31-April 1, 2017

Other Awards

- Outstanding Graduate of Mathematics: 2017, Saginaw Valley State University (SVSU)
 - Given to graduating math majors demonstrating aptitude and genuine interest in math. Awarded based on a vote among the math faculty.
- Braun Award for Writing Excellence: 2017, SVSU
- Robert S. P. Yien First Year Writing Award Finalist: 2013, SVSU
- SVSU Dean's Scholarship: 2012-2017, SVSU
- President's List: Fall 2016, SVSU
- Dean's List: Fall 2013, Winter 2014, Fall 2014, Winter 2015, Fall 2015, Winter 2016, SVSU