Dion Mann

Department of Mathematics, University of Connecticut
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Education

Ph.D. in Mathematics, University of Connecticut — Expected May 2028
Advisor: Ambar N. Sengupta
Dissertation: *A Diffeological Approach to Path Space Connections and Holonomy* (tentative)

M.S. in Mathematics, University of Connecticut — 2025

B.A. in Mathematics and Physics, University of Colorado Boulder — 2023
Advisor: Markus J. Pflaum
Thesis: *Deformation Quantization and Applications to Quantum Field Theory*

Teaching Experience

Instructor of Record — University of Connecticut

MATH 1131Q **Calculus I** — Fall 2026
Math Teaching Innovation Fellow · one lecture and two discussion sections
- Coordinated course with common exams; all other course materials, including lecture notes, lecture slides, quizzes, and weekly discussion activities, created from scratch.
- Used Amplify Classroom for live, low-stakes participation in lecture; Monday discussion activities serve as exit tickets that introduce each week's material.

MATH 1070Q **Mathematics for Business and Economics** — Summer 2026
CAPS/SSS Summer Bridge Program · designed the entire course
- Five-week intensive course with daily 110-minute classes, part of UConn's summer bridge program for first-generation, low-income, and underrepresented students.
- Designed every component: syllabus, LaTeX lecture slides, daily worksheets, homework sets, quizzes, exams, and a course webpage (dionmann.github.io/resources/math1070).
- Built the course around Second Chance Grading (O. E. Fernandez, *PRIMUS*, 2021): each topic is assessed by a quiz and again on a weekly "second chance" exam, and the higher score counts.

MATH 1020Q **Problem Solving** — Spring 2025 – Spring 2026
Two lecture sections per semester
- Paired adapted lecture slides with live whiteboard work: slides pose questions that are then solved with the class in real time.
- Designed a six-question quiz format in which only four questions count and one is always a vocabulary question, rewarding attention to mathematical language and lowering the stakes of any single hard problem.
- Student evaluations (≈ 90 respondents): mean overall instructor rating 4.7/5, compared with a department mean of 3.8–3.9 for 1000-level courses.

Teaching Assistant — University of Connecticut

MATH 2110Q **Calculus III** — Fall 2024
Three discussion sections

MATH 1132Q **Calculus II** — Spring 2024
Two discussion sections

MATH 1131Q **Calculus I** — Fall 2023
Two discussion sections

Tutoring 2020–2023

Mathematics Academic Resource Center (MARC), University of Colorado Boulder.
Tutored undergraduates in calculus, algebra, and differential equations.

Private Tutoring.
Tutored high school students in AP Physics and AP Calculus BC.

Mentoring

TA Mentor University of Connecticut
UConn Mathematics TA Mentoring Network Fall 2024 – Present
Paired with first-year graduate teaching assistants through the department's mentoring network to support their development as instructors.

Directed Reading Program (DRP) Mentor University of Connecticut
Supervised semester-long undergraduate independent study projects
- Differential Geometry of Curves and Surfaces — Fall 2026
- Homological Algebra and De Rham Theory — Spring 2026
- Singular Homology with Applications to Biology — Fall 2024

Awards and Fellowships

Math Teaching Innovation Fellowship, University of Connecticut 2026–2027
Awarded each year to three graduate students, one for each course in the Calculus I–III sequence, to teach calculus as instructor of record using innovative teaching methods.

GAANN Fellowship, University of Connecticut 2026–2027
Graduate Assistance in Areas of National Need, funded by the U.S. Department of Education.

Conference Participation Award, University of Connecticut 2026
Travel funding for conference attendance.

Chancellor's Achievement Scholarship, University of Colorado Boulder 2019–2023

Research Interests

Differential topology and mathematical physics.
I work at the interface of geometry, topology, and physics, especially gauge theory on principal bundles, holonomy, and higher parallel transport in the framework of generalized smooth spaces such as diffeological spaces. My current work develops a diffeological approach to connections and holonomy on path spaces. Broader interests include deformation quantization and the geometric foundations of classical and quantum mechanics.

Publications and Preprints

[1] D. Mann, *A Diffeological Construction of Singer's Universal Connection.* arXiv:2605.07730, 2026. Revised and resubmitted to *Journal of Geometry and Physics.*

Talks

Conference Talks

"Holonomic Gauge Theory and the Reconstruction Theorem," *51st Annual New York State Regional Graduate Mathematics Conference*, Syracuse University — March 2026

"Diffeology: A Smooth Analogue of Topology," *Mathematics Continued Conference*, University of Connecticut — March 2026

"Quantum Mechanics as a Deformation of Classical Mechanics," *Math For All*, University of Colorado Boulder — February 2023

Seminar and Expository Talks (University of Connecticut unless noted)

"A Diffeological Construction of Singer's Universal Connection," *Global Diffeology Seminar*, online — June 2026

"Gauge Theory, Path Spaces, and the Universal Connection in Diffeology," *Graduate Research Forum* — May 2026

"An Invitation to Mathematical Physics," *SIGMA Seminar* — March 2026

"The Universe and Its Internal Dimensions," *SIGMA Seminar* — September 2025

"Diffeology," *SIGMA Seminar* — November 2024

"Quantum Mechanics as a Deformation of Classical Mechanics," *Math Club* — October 2024

"G-Bundles and Torsors," *Topos Theory and Geometry Seminar* — April 2024

"Geometric Morphisms and Sheaves," *Topos Theory and Geometry Seminar* — March 2024

"Quantum Mechanics as a Deformation of Classical Mechanics," *SIGMA Seminar* — March 2024

"Sheaves on Manifolds," *Topos Theory and Geometry Seminar* — February 2024

"The Geometry of Classical Mechanics," *Geometry and Analysis Student Seminar* — September 2023

"Consequences of the First Variation Formula," *Geometry and Analysis Student Seminar* — May 2023

Undergraduate Research

Research Experience for Undergraduates (REU) — University of Colorado Boulder

Project: *Derived Poisson Structure on* $\mathfrak{sl}_2$ · Mentor: Yining Zhang — Summer 2021

Studied Poisson structures and their homological extensions, Hochschild cohomology, and Poisson and Lie algebras from the perspective of noncommutative algebraic geometry.