Dr. Jonathan Belcher

Ph.D. Mathematics, CU Boulder

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Professional Interests and Goals

I AM a passionate mathematician and educator with a background in non-commutative geometry, topology, functional analysis, and differential geometry. My goal is to apply my broad mathematical knowledge and teaching experience towards developing curricula in engineering and applied sciences. I also enjoy mentoring and motivating developing minds, helping to guide them towards career fields that will interest and inspire them. The current challenges our civilization faces are going to require a strong, disciplined, and insightful generation of people. With the setbacks of COVID-19 and diminishing efficacy of our K-12 educational programs, it is up to the innovation of our post-secondary institutions to make sure that the next generation has the preparation they need for our rapidly changing world. This is a challenge that excites and inspires me, and I love to work with institutions that feel similarly that education is one of the most powerful tools we have to change the world.

History

2022–Present **Post-Doctoral Teacher/Researcher**, *Convex Optimization and Machine Learning*, *University of Colorado, Boulder*

2019 – 2022 **Mathematics Lecturer**, *University of Colorado, Boulder*

2012 – 2019 **Graduate Student in Mathematics**, *University of Colorado, Boulder*

2009 – 2012 **Education Editor**, *McGraw-Hill Education and Independent Contractor*

2009 – 2009 **Actuarial Contractor**, *Nationwide Insurance*

Technical Skills

- **Basics of Python, NumPy, SymPy, Jupyter Notebooks**
- **SQL scripting, Excel, and VBA**, *Nationwide Insurance*
- **C++ and Matlab intro courses**, *The Ohio State University*
- **YouTube Online Lecture Series**, *Teaching and Leadership*

Education

May, 2019 **Ph.D. Mathematics**, *University of Colorado, Boulder*

May, 2016 **M.A. Mathematics**, *University of Colorado, Boulder*

June, 2009 **B.S. Mathematics**, *The Ohio State University*

June, 2009 **B.S. Physics**, *The Ohio State University*

Ph.D. Thesis

Title Bridge Cohomology: Generalizing Hochschild and Cyclic Cohomologies and applications to Chern-Weil Theory

Supervisor Markus Pflaum

Publications

In preparation **Bridge Cohomology: A generalization of Hochschild and cyclic cohomologies with applications to manifolds with boundary**, Jon Belcher and Markus Pflaum

Mentoring

Thesis Co-advising **A Generalization of S-Divergence to Symmetric Cone Programming via Euclidean Jordan Algebra**, *Zhuochen (Jaden) Wang*

Math / Curriculum Advising
Logan Martin - *Geometric Unity, Mathematical Physics, Aerospace Engineering*
Kevin Stull - *Natural Language Processing, Neurolink, Data Science, Machine Learning*
Dominic Glimp - *Algebraic Topology, Differential Geometry, Analysis*

Awards and Honors

Talk **Bridge Cohomology: Generalizing Hochschild and Cyclic Cohomologies via Triangulated Categories**

Invited *Online Global Noncommutative Geometry Seminar.* Org: Xiang Tang, Guoliang Yu. Aug. 12, 2020

Invited *AMS Special Session on Quantum Theory of Matter Meets Noncommutative Geometry and Topology, I.* January 2020

Talk **Bridge Cohomology: Generalizing Hochschild and Cyclic Cohomologies.**
CIMPA School for Noncommutative Geometry. Meridas, Mexico. December 2018
AMS Fall Western Sectional. October 2018
K-Theory Conference, Argentina. July 2018
Texas A&M Noncommutative Geometry Conference. May 2018

Fellowships
Summer 2018 Adele V. Leonhardy Memorial Scholarship, $4K
Summer 2017 University of Colorado Graduate School Summer Fellowship $4.5K
Summer 2016 Sieglinde Haller Scholarship, $4.5K

Certification **Society of Actuaries Exam P** 2008

Service

Math Community Contributions
The Geometry of Classical and Quantum Fields, *Liber Mathematicae*, Markus Pflaum, Jon Belcher (Contributing Author), `www.libermath.org/GeometryClassicalAndQuantumFields/` Fall 2017

Gone Fishing: Conference on Poisson Geometry, *Assistant Organizer*, March 10-13, 2016

The Serre-Swan Theorem, *expository paper contributed to The CRing Project*, Akhil Mathew, M. Pflaum, et al., Spring 2016

Volunteering
Boulder Committee on Rights and Compensation - Board Member, Database and Membership Records Manager 2018-2019

Andy 24 Memorial Charity Event 2008 - 2010

Teaching Summary

Lecturer	MATH 2510: Intro to Statistics	5 Semesters
	APPM 2360: Differential Equations with Linear Algebra	2 Semester
	MATH 2130: Linear Algebra	1 Semester
	APPM 2350: Calculus III for Engineers	2 Semesters
	MATH 2400: Calculus III	2 Semesters
	APPM 1360: Calculus II for Engineers	2 Semester
	MATH 2300: Calculus II	3 Semesters
	APPM 1350: Calculus I for Engineers	2 Semester
	MATH 1300: Calculus I	3 Semester
	MATH 1150: Precalculus	4 Semesters
	MATH 1212: Data and Models	3 Semesters
	MATH 1081: Business Calculus	1 Semester
Teaching Assistant	MATH 1300: Calculus I	1 Semester
	MATH 1150: Precalculus	2 Semesters
	MATH 1011: College Algebra	1 Semester

Diversity and Inclusion **Young Scholars Summer Bridge Program**, *The Ohio State University*, Summer 2008

Work Experience

2009 – 2012 **Education Editor**, *McGraw-Hill Education and Independent Contractor*
- Edited online mathematical content using web applications

2009 – 2009 **Actuarial Contractor**, *Nationwide Insurance*
- Built and tested code factors for new life insurance products
- Fixed and reported on product defects through logical analysis of system code and databases with SQL and VBA