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. I also have interests and side projects in data science, crypto currencies, finance, and investing. 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 with the sentiment 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*

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*

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*

Technical Skills

- **Python, NumPy, SymPy, Jupyter Notebooks**
- **Data Analysis, Data Visualization with Pandas/python**
- **SQL scripting, Excel, and VBA**, *Nationwide Insurance*
- **C++ and Matlab intro courses**, *The Ohio State University*
- **Canvas** - Building course pages, organizing gradebook, using design tools, kaltura videos, integrating gradescope, webassign, google docs, and third party apps.
- **Zoom** - Scheduling and running courses, uploading recordings to youtube and canvas, using proctorio
- **YouTube Online Lecture Series**, *Teaching and Leadership*

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
Work Groups	APPM 1390: A Game for Calc 3	1 Semester
	APPM ——: Mathematical Brain Training	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

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

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

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