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Kathryn Burton Mulholland

Curriculum Vitae

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Summary

I have taught a range of mathematics courses and Notre Dame Learning workshops. My administrative roles include teaching and coordinating the mathematics courses for the Mary E. Galvin Science & Engineering Scholars, serving on the Undergraduate Service Committee, and participating in the Foundational Course Transformation Academy. Additionally, I am actively involved in outreach initiatives such as Math Circles and have taken on leadership roles within the Mathematical Association of America. Through my teaching, service, and outreach, I consistently foster an inclusive and intellectually stimulating environment for students and the broader community.

Education

- Jan 2021 **Ph.D.**, *University of Notre Dame*, Notre Dame, IN.
Mathematics
Dissertation: "Generalized Cluster Structures Compatible with the Cremmer-Gervais Poisson Bracket on Rectangular Matrices"
Advisor: Michael Gekhtman
- May 2016 **M.S.**, *University of Notre Dame*, Notre Dame, IN.
Mathematics
- June 2014 **B.S.**, *California Polytechnic State University*, San Luis Obispo, CA.
Mathematics, *summa cum laude*

Employment

- July 2020 - **Assistant Professor of the Practice**, Department of Mathematics, University of Notre Dame.
Present
- 2020-2021 **Postdoctoral Associate**, Kaneb Center for Teaching & Learning, University of Notre Dame.
- 2019-2020 **Graduate Associate**, Kaneb Center for Teaching & Learning, University of Notre Dame.

Postdoctoral Awards, Honors And Fellowships

- 2024-2025 Provost's Fellow for Teaching and Learning
- 2024-2025 Transformational Leaders Program (TLP) Faculty Fellow
- 2024 Teaching and Learning Technologies "Canvas Legend"

Predoctoral Awards, Honors, and Fellowships

- 2014-2019 Dean's Fellowship, University of Notre Dame
- 2018 Outstanding Graduate Student Teaching Award, The Graduate School and the Kaneb Center for Teaching and Learning, University of Notre Dame
- 2017 Striving for Excellence in Teaching Certificate, Kaneb Center for Teaching and Learning, University of Notre Dame
- 2014 Outstanding Senior in Mathematics, Cal Poly
- 2013 George H. McMeen Scholarship, Cal Poly
- 2012 Ralph M. Warten Memorial Scholarship, Cal Poly
- 2011 Volmar A. and Viola I. Folsom Scholarship, Cal Poly

Professional Talks

Extramural

Conferences

- *Promoting Mathematical Curiosity and Creativity*
Excellence in Teaching Conference, Institute for Educational Initiatives, University of Notre Dame, March 9, 2024
- *Generalized Cluster Structures Compatible with the Cremmer-Gervais Poisson Bracket on Rectangular Matrices*
Cluster structures in geometry, physics, combinatorics and representation theory, Jerusalem, Israel, December 10, 2018
- *Generalized Cluster Structures Compatible with the Cremmer-Gervais Poisson Bracket on Rectangular Matrices*
American Mathematical Society (AMS) Fall Central Sectional Meeting, University of Michigan, Ann Arbor, MI, October 20, 2018

Panel Appearances

- *Workforce Productivity and the Impact of AI*, Northern Indiana Innovation Day, August 21, 2024

Internal

Workshops

- *What to Do After the Test*, Kaneb Workshop, March 4, 2021
- *Using Open Educational Resources In Your Class*, Kaneb Workshop, April 14, 2021

- *Active Learning in the (Socially Distant) Classroom*, Kaneb Workshop, October 6, 2020
- *Introduction to Backward Course Design*, Kaneb Workshop, September 29, 2020
- *Universal Design for Learning*, Kaneb Workshop, March 3, 2020
- *Teaching Critical Thinking in STEM*, Kaneb Workshop, April 16, 2020
- *Discussion Sections and Tutorials via Zoom*, Kaneb Workshop, March 25, 2020
- *Hosting Office Hours in Zoom*, Kaneb Workshop, March 25, 2020
- *Foundations of Teaching in STEM*, Kaneb Workshop, Fall 2019
- *Flipped Classrooms*, Kaneb Workshop, October 1, 2019
- *Course Design Bootcamp*, Kaneb Workshop, November 1, 2019

Panel Appearances

- *Leading STEM Labs and Tutorials*, Notre Dame Learning Graduate TA Orientation, August 23, 2024
- *Leading STEM Labs and Tutorials*, Notre Dame Learning Graduate TA Orientation, August 19, 2023

Attended Conferences and Workshops

- Mathematical Association of America (MAA) MathFest, Indianapolis, IN, Aug 2024
- de Nicola Center for Ethics and Culture Fall Conference: "Dust of the Earth: On Persons," Notre Dame, IN, Nov 2023
- Mathematical Association of America (MAA) MathFest, Tampa, FL, Aug 2023
- Conference on Research in Undergraduate Mathematics Education, Omaha, NE, Feb 2023
- Annual Conference on The First-Year Experience, Los Angeles, CA, Feb 2023
- de Nicola Center for Ethics and Culture Fall Conference: "'And It Was Very Good': On Creation," Notre Dame, IN, Nov 2022
- Professional Development for Emerging Education Researchers, Rochester, NY, Jun 2022
- de Nicola Center for Ethics and Culture Fall Conference: "I Have Called You by Name: Human Dignity in a Secular World," Notre Dame, IN, Nov 2021
- Joint Mathematics Meetings, Online, Jan 2021
- Mathematical Association of America (MAA) Project NExT Sessions, Online, Jul 2020
- Joint Mathematics Meetings, Denver, CO, Jan 2020
- de Nicola Center for Ethics and Culture Fall Conference: "I Have Called You Friends," Notre Dame, IN, Nov 2019
- Women in Science Conference, Notre Dame, IN, Oct 2018

- Midwest Women in Mathematics Symposium (WIMS), Purdue University, West Lafayette, IN, Apr 2018
- Cluster Algebras: Twenty Years On, CIRM, Marseille, France, March 2018
- Discrete Models in Geometry and Mathematical Physics Summer School, TU Berlin, Germany, Sept 2017
- Cluster Algebra Spring School, University of Connecticut, CT, May 2017
- "Gone Fishing" Poisson Geometry, Notre Dame, IN, May 2017
- Workshop on Lie Theory and Cluster Algebras, Rome, Italy, Oct 2016
- Algebra, Geometry and Combinatorics Day (ALGECOM), Notre Dame, IN, Apr 2016
- Hot Topics: Cluster algebras and wall-crossing, MSRI, Berkeley, CA, Mar 2016
- Underrepresented Students in Topology and Algebra Research Symposium (USTARS), Fort Myers, FL, Apr 2015
- Midwest Women in Mathematics Symposium (WIMS), Dominican University, Chicago, IL, Mar 2015

Teaching and Advising

Overview

In my teaching career, I've had the opportunity to instruct a range of mathematics courses, from precalculus and introductory calculus to a University Seminar on mathematics and music. I've developed and taught problem-solving courses specifically for the Mary E. Galvin Science & Engineering Scholars Program and guided both undergraduate and graduate students through directed readings.

Regular Courses Taught

MATH 10150 Principles for Calculus

- Covers the precalculus concepts that are most critical to success in calculus. In particular, the course investigates functions both mathematically and through a variety of applications, to deepen students' understanding of the concepts and strengthen their ability to apply mathematics to real-world situations.
- 34 students
- Taught FA24

MATH 10250 Elements of Calculus I

- A one semester calculus course designed for students in arts and letters, architecture, or business.
- 58 students
- Taught SP21

MATH 10550 Calculus I

- A first-semester calculus course designed for students in science and engineering.

- 40-75 students
- Taught FA24, FA23, FA22, SP22, FA21, FA20

MATH 10560 Calculus II

- A second-semester calculus course designed for students in science and engineering.
- 40-75 students
- Taught SP23, SP22, FA21, SP21, SP18, SP17

MATH 13187 Mathematics University Seminar

- A course for first-year students devoted to an introductory topic in mathematics, with an emphasis on the fundamentals of academic writing. My seminar explored the interesting connections between mathematics and music - from patterns and rhythms to ratios and intervals to sums of trigonometric waves and musical analysis.
- 13 students
- Taught FA23

MATH 13550 Calculus I Problem Solving

- A one-credit course designed for students in the Mary E. Galvin Science & Engineering Scholars Program.
- 40 students
- Taught FA23, FA22

MATH 13560 Calculus II Problem Solving

- A one-credit course designed for students in the Mary E. Galvin Science & Engineering Scholars Program.
- 40 students
- Taught SP23

MATH 14360 Calculus B (Online)

- A synchronous Summer Online second-semester calculus course designed for biology and social science majors.
- 10-25 students
- Taught SU21, SU20, SU19, SU18

MATH 46800 Directed Readings

- Designed to offer undergraduate students direction on readings not covered in the curriculum which relate to the student's area of interest.
- FA19-SP20
 - Student: Carter Hrabrick
 - Reading: *A Friendly Introduction to Number Theory* by Joseph H. Silverman

MATH 86700 Directed Readings

- Designed to offer graduate students direction on readings not covered in the curriculum which relate to the student's area of interest.
- FA23
 - Student: Clay Whiffen
 - Reading: *Teaching and Learning STEM* by Felder and Brent

Special Teaching

Seminar of Undergraduate Mathematical Research

- I facilitated an 8-week graduate-level seminar on Computational Algebraic Geometry for undergraduate honors mathematics students who intend to do post-graduate work in the mathematical sciences.
- 4 students
- Taught SU17

Curriculum development

- o I developed MATH 13550 and MATH 13560 for the Mary E. Galvin Science & Engineering Scholars Program. Course goals are to help students develop a deep understanding of the main ideas in calculus (and its prerequisites), improve study habits and metacognition, further critical thinking and problem solving skills, and collaborate productively with a group.
- o I developed MATH 13187 as a University Seminar on mathematics and music. Course goals were to identify and analyze mathematical structures and patterns in music and to improve writing abilities (generating ideas, conducting research, drafting, revising, and editing).
- o I designed and recorded instructional content for the ASCEND Project. A Scholarly Community Entering Notre Dame (ASCEND) is an online summer program designed for incoming Notre Dame students in Science and Engineering to assess and refresh qualitative skills. I created the module on trigonometry. This involved scripting, producing, and reviewing 9-10 7 minute videos as well as creating materials for the Canvas page.

Department, College, and University Service

- o **Service Committee**, Department of Mathematics
Sep 2024 - Present
The Undergraduate Service Committee advises the Department Chair and the Director of Undergraduate Studies on matters concerning the undergraduate service courses and programs, including curricula, course offerings and organization.
- o **Foundational Course Transformation Academy**, Notre Dame Learning
2024 - Present
The goal of the FCTA is use data analytics, cutting-edge pedagogical techniques, and other tools to redesign the Calculus I/II sequence to significantly enhance student learning.
- o **Praxis Pria Pilot**, OIT Teaching and Learning Technologies (TLT)
Fall 2024
OIT TLT is piloting an AI assistant, Praxis Pria, designed to seamlessly integrate with Canvas to enhance the learning experience for both students and faculty. I was one of 15 instructors selected to participate in the pilot.

- **Academic Tutoring Landscape for Advising Students (ATLAS)**
2022 - Present
ATLAS is a team of faculty and staff that meets to coordinate tutoring training, services, and resources on campus.
- **Outreach & Community Engagement Meta Committee**, College of Science
2022-2023
I served on this committee as the representative for the Math Department. The purpose of the committee was to help keep track of what outreach and community engagement was happening throughout the college, help budget accordingly, and identify any duplication efforts.
- **Learning Management System (LMS) Pilot**
Spring 2021
The Faculty LMS Succession Committee selected me as part of a representative group of faculty to participate in piloting Canvas as a potential new LMS.

Professional Affiliations, Service and Leadership

Professional Affiliations

- 2020 - Present **Member**, *Mathematical Association of America*.
- 2014-Present **Member**, *Association for Women in Science*.
- 2014-Present **Member**, *Association for Women in Math*.
- 2014-Present **Member**, *American Mathematical Society*.
- 2020 - 2021 **Fellow**, *MAA Project NExT*.
Project NExT is a professional development program for new faculty in the mathematical sciences that promotes "New Experiences in Teaching".
- 2019-2020 **Fellow**, *Applied Academic Leadership Program*, Notre Dame.

Service

- Oct 2023 **Conference Organizer**, Mathematical Association of America (MAA) Indiana Section Meeting, Notre Dame, IN
- Jun 2023 **Conference Organizer**, Cluster algebras and Poisson geometry, Levico Terme, Italy
- Aug 2021 **Session Organizer**, "Professional activities for teaching focused professors including scholarship of teaching and learning", Mathematical Association of America (MAA) Virtual MathFest

Leadership

2021-2024 **Outreach Coordinator**, *Indiana Section of the Mathematical Association of America (MAA)*.

The Outreach Coordinator's primary responsibilities include managing the Section Visitors Program and advertising section events to Indiana colleges, universities, and high schools. The Outreach Coordinator may also reach non-participating mathematicians by advertising the Section Visitors Program, locating contact information for high school and 2-year college math departments within an hour of upcoming meetings and advertise the meeting by email or by poster, and encouraging faculty at universities throughout the state to post the meeting poster in their departments.

Community Work

2019-Present **Math Circles**.

Math Circles are outreach programs for K-12 students focused on the enjoyment of mathematical problem solving. The weekly meetings are lively and interactive with problems that have a "low threshold" and "high ceiling". From 2019-2021, I helped lead the Germain Math Circle. Since 2022, I have been coordinating all of the Math Circles.

2017-2022 **Judge**, *Northern Indiana Regional Science & Engineering Fair*.

The goal of this fair is to expose young minds to the world of science while providing a positive environment for them in which they can experiment, create, and explore under the guidance and with the support of their parents and teachers. Students choose a project topic from a variety of categories and are given the freedom and independence to design a project that suits their interests.

Summer 2021 **Visiting Fellowship in Assessment for AP Calculus**, *College Board*.

I reviewed a recent AP exam and provided feedback on the rigor, coverage, and skills that it assesses. This fellowship was designed to study the AP Calculus BC Exam and its alignment with desired outcomes for related courses at a range of higher ed institutions.

2017-2020 **Mentor**, *STEMentorship Program*.

Each year I was connected with an undergraduate woman in STEM for professional development, networking, and an exchange of ideas.

2017-2019 **Tutor**, *Upward Bound*.

Upward Bound is a college preparatory program that targets students who demonstrate a need and desire for academic support from the South Bend Community School Corporation. As a tutor, I offered academic support and help equip South Bend high school students to enter and succeed in higher education.

April 2017 & **Workshop Leader**, *Expanding Your Horizons*.

2019 Expanding Your Horizons is a STEM conference for middle school girls to meet STEM role models and learn more about careers in those fields. In 2017, I motivated girls to become innovative and creative thinkers using a craft-based geometric project. In 2019, I led a "Learn About College" session and introduced the girls to various STEM careers.

Feb 2018 **Activity Leader**, *Science Alive, St. Joseph County Public Library*.
Science Alive is a library event that showcases interactive exhibits and awesome activities with local science-related organizations.