MATTHEW GILLESPIE

matthew.gillespie1999@gmail.com / mjgille1@asu.edu
541.226.1378
1216 East Vista Del Cerro Drive, Tempe AZ, 85281

RESEARCH INTERESTS

My research interests mainly pertain to the theory of C^*-algebras, crossed products of C^*-algebras and their representation theory, along with the theory of C^*-dynamical systems. Other research interests of mine include nonabelian harmonic analysis, graph C^*-algebras, and ideal correspondences of crossed product C^*-algebras.

EDUCATION

Arizona State University *August 2022 - Present*
2nd Year, Ph.D Degree - Mathematics W/ Specialization in C^*-algebras Overall GPA: 4.17/4.00
Department of Mathematics

Oregon State University *September 2017 - Present*
4th Year, BS Degree - Mathematics W/ Minor in Actuarial Science Overall GPA: 3.75/4.00
Department of Mathematics

North Valley High School *2013 - 2017*
Secondary Education Overall GPA: 3.85/4.00

TEACHING / WORK EXPERIENCE

Arizona State University - Graduate Teaching Assistant Tempe, Arizona
Department of Mathematics & Statistical Sciences *January 2023 - May 2023*

- Providing outstanding out of classroom tutoring and instruction for students in introductory real analysis, grading assignments covering advanced mathematical concepts and providing clear feedback for the student's benefit
- Working alongside a mathematics professor to coordinate the grading of assignments, providing a multitude of students with tutoring, and hosting weekly office hours

Arizona State University - Graduate Teaching Assistant Tempe, Arizona
Department of Mathematics & Statistical Sciences *August 2022 - December 2022*

- Leading a multitude of engaging calculus recitations for first year students, grading assignments, and providing original instruction on course material in a welcoming and engaging manner
- Working alongside a mathematics professor to develop weekly curricula and assignments, and hosting office hours to tutor students outside of the classroom environment

Oregon State University - Mathematics Learning Assistant Corvallis, Oregon
Department of Mathematics *September 2021 - Present*

- Assisting students in the classroom and recitation settings with conceptual and computational questions in the context of integral calculus
- Working alongside a mathematics professor and graduate teaching assistants to instruct students, review lesson plans, and provide a welcoming learning environment for all attending mathematics students

Oregon State University - Mathematics grader Corvallis, Oregon
Department of Mathematics *January 2021 - March 2021*

- Assigned as needed up to 10 hour allotments of time weekly for the grading and feedback of homework assignment and examinations for differential calculus

· Assisting students with grading and feedback concerns, including the provision of corrected methodologies for assigned problems on homework and examinations

Oregon State University - Mathematics & Statistics tutor Corvallis, Oregon
Department of Mathematics *September 2019 - Present (working as needed)*

· Assigned as needed up to 10 hour allotments of time weekly for assistance
· Assisting students in a wide variety of mathematical / statistical topics ranging from abstract algebra to real analysis
· Explaining complex and abstract mathematical / statistical concepts in a time efficient and intuitive manner for students of all mathematical maturities

Allcare Health - Actuarial Intern Grants Pass, Oregon
Health Insurance Management *June 2018 - September 2018 & Dec 2018 - Jan 2019*

· Provided in depth statistical and mathematical analysis of health insurance claims data to the financial and business sectors of Allcare Health
· Worked in tandem with an actuary to assist the state of Oregon in several critical statistical analyses reviewed and presented to the CEO of Allcare Health alongside the Oregon Health Authority and the federal government

RESEARCH EXPERIENCE

Arizona State University - Research Assistant Tempe, Arizona
Department of Mathematics & Statistical Sciences *June 2023 - Present*

· Working in conjunction with Dr. John Quigg
· Extending the ideas of "The Ladder Technique" from the duality theorems of crossed product C^*-algebras to the imprimitivity theorems of crossed products
· Established a bijective correspondence between the action / coaction invariant ideals of "restricted" crossed products by a normal subgroup of a locally compact group G.

Arizona State University - Research Assistant Tempe, Arizona
Department of Mathematics & Statistical Sciences *March 2023 - Present*

· Working in conjunction with Dr. John Quigg, Dr. S. Kaliszewski, and Dr. Dana P. Williams on "The Ladder Technique"
· Developed a novel technique for finding bijective correspondences between action / coaction invariant ideals of crossed product C^*-algebras by a fixed locally compact group G.
· Defined a natural notion of coaction invariant ideals of crossed products, giving rise to a general schema for finding bijective correspondences between objects possessing a duality theory within the scope of C^*-algebras

CONFERENCES

1. Great Plains Operator Theory Symposium (GPOTS, 2022) - Washington University in St. Louis
2. Great plains Operator Theory Symposium (GPOTS, 2023) - Ohio State University

   Contributed speaker - Presented the "Ladder Technique"
3. Groundwork for Operator Algebras Lecture Series (GOALS, 2023) - Perdue University
4. Young Mathematician in C^*-algebras (YMC*A, 2023) - Katholieke Universitiet

ACADEMIC ACHIEVEMENTS

1. Joel Davis Award for Outstanding Work in Mathematics - Faculty Recommended, 2021
2. Pi Mu Epsilon Mathematics Honors Society - Inducted 2019
3. Oregon State University Honor Roll - Several terms

RELEVANT COURSES

1. Graduate Real Analysis (2 years):

i. Analysis of Abstract Metric Spaces - Properties of metric spaces and normed spaces, including ℓ_p spaces. Completeness and applications, including fixed point theorems. Compactness, equicontinuity and the Arzela-Ascoli theorem in an arbitrary compact metric space. Uniform continuity and uniform convergence, including applications.

ii. Abstract Measure Theory & Integration - Measure and integration theory over abstract measure spaces, basic convergence theorems, Lebesgue spaces, Fubini's theorem, Radon-Nikodym theorem, and applications. Decompositions and differentiation of measures, Banach space theory, general topology, locally compact Hausdorff spaces, positive linear functionals on $C_c(X)$ and the Reisz-Markov- Kakutani theorem.

iii. Topics in Functional Analysis - Banach Space theory, Hilbert Space theory, orthonormal bases of a Hilbert space, dual spaces, operator theory including open mapping theorem, Riesz representation theorem and Hahn Banach theorem with the standard norm topology and a rigorous treatment of Fourier analysis in L^1, L^2.

2. Graduate Abstract Algebra (1 year sequence):

i. The theory of groups and rings. Cyclic groups, cosets, normal subgroups, the isomorphism theorems for groups and rings, free groups, the symmetric and dihedral groups, classification theorems of finitely generated abelian groups and low order groups, direct and semidirect products, group actions, the Orbit stabilizer theorem, the class equation, the Sylow theorems, nilpotent and solvable groups. General rings, integral domains, principle ideal domains, Euclidean domains, Unique Factorization domains and the theory of factorization in rings, local rings and rings of quotients, Neotherian rings, polynomial rings and factorization of polynomials, Eisenstein's criterion.

ii. The theory of modules, concepts of advanced linear algebra, fields and Galois theory. Commutative diagrams, exact and short exact sequences, split exact sequences, free modules, cyclic modules and finitely generated modules over a PID, Neotherian modules. Basic theory of fields, field extensions, algebraic and transcendental extensions, automorphism groups of fields, the Galois group of a field extension, Galois theory of polynomials and their classification results, normal and separable extensions, algebraic closures and normal closures, purely inseparable extensions, cyclic, abelian, cyclotomic and radical extensions of fields. Abstract linear algebra over arbitrary fields, diagonalization of a linear operator, the generalized eigenspace, Jordan canonical form, and similarity classes of linear operators over various fields.

3. Functional Analysis - General topological vector spaces, completions, re-treatment of dual spaces and operator theory including open mapping theorem, Riesz representation theorem, closed graph theorem and Hahn Banach theorem, Hahn Banach Separation theorems, convexity, spectral theory of compact operators, sesquilinear forms.

4. Graduate Partial Differential Equations - Partial differential equations of physics, including those of potential theory, wave propagation, and heat flow, treated by classical means, generalized functions and variational principles. Square summable function methods and integral equations.

5. Measure Theoretic Probability - General abstract theory of probability measures and random variables, including weak convergence, characteristic functions, central limit theory, conditional expectations, martingales.

SKILLS / MISCELLANEOUS

Programming skills:
LaTex(experienced), Microsoft Excel(intermediate), Matlab(basic), Microsoft SQL(basic), R studio(basic), Python(basic), SAS(basic)

Professional & Soft Skills:
· Highly interpersonal from extensive experience tutoring students, alongside interning in a professional business environment

· Can collaborate with a diverse team as well as independently without direct supervision when needed

· Excellent time management and multitasking abilities

Extracurricular:

· Oregon State University Mathematics Club Member; October 2020 - Present

· Card Games, Puzzles, Board Games, Kayaking, Bowling, Hiking, Zip-lining, Weight Lifting