DR. ZACHARY CRAMER

Lecturer ⋄ Mathematics Undergraduate Group
Faculty of Mathematics ⋄ University of Waterloo ⋄ Waterloo, ON, Canada
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EDUCATION

Doctor of Philosophy, Pure Mathematics   *September 2015 - June 2020*
University of Waterloo, Waterloo, ON
Supervisor: Dr. Laurent Marcoux
Thesis: *Compressible Matrix Algebras and the Distance from Projections to Nilpotents*

Master of Mathematics, Pure Mathematics   *September 2014 - August 2015*
University of Waterloo, Waterloo, ON
Supervisor: Dr. Laurent Marcoux
Thesis: *Normal Limits of Nilpotents and Similarity in Purely Infinite C*-Algebras*

Bachelor of Mathematics, Honours Mathematics and Statistics   *September 2010 - June 2014*
University of Windsor, Windsor, ON
Minor in Economics

TEACHING INTERESTS

– Linear algebra
– Single variable and multivariable calculus
– Real and complex analysis
– Abstract algebra

RESEARCH INTERESTS

– Teaching pedagogy
– Operator theory/operator algebras
– Linear algebra
– Functional analysis

TEACHING EXPERIENCE

Lecturer, Mathematics Undergraduate Group (MUG)   *January 2020 - Present*
Faculty of Mathematics, University of Waterloo, Waterloo, ON

- *Course Instructor*

  – Teach 6 core and service courses annually, both on-campus and online
  – Coordinate courses by designing assessments, managing TAs, and/or leading a team of instructors
  – Recent courses:

Fall 2021:	MATH 207	Calculus III for Non-Specialists (online) ∗ coordinator
	MATH 237 (x2)	Calculus III for Honours Mathematics
Spring 2021:	MATH 119 (x2)	Calculus II for Honours Mathematics (online) ∗ coordinator
	MATH 237	Calculus III for Honours Mathematics (online)
Winter 2021:	MATH 119 (x2)	Calculus II for Honours Mathematics (online) ∗ coordinator
Fall 2020:	MATH 207	Calculus III for Non-Specialists (online) ∗ coordinator
	MATH 237	Calculus III for Honours Mathematics (online)
Spring 2020:	MATH 119 (x2)	Calculus II for Honours Mathematics (online) ∗ coordinator
Winter 2020:	MATH 135 (x2)	Algebra for Honours Mathematics ∗ coordinator

  – Developed full suite of over 90 video lessons for both MATH 119 online and MATH 207 online.

Sessional Instructor

- *Coordinator and Instructor, PMath 336 - Introduction to Group Theory*   *Fall 2019*
  University of Waterloo, Waterloo, ON
    - Structured an introductory group theory course for students in the Faculty of Mathematics
    - Prepared and delivered three lectures per week to a class of 45 students
    - Created bi-weekly assignments and quizzes, as well as a midterm and final exam
    - Coordinated two graduate teaching assistants

- *Coordinator and Instructor, Math 106 - Applied Linear Algebra I*   *Fall 2018*
  University of Waterloo, Waterloo, ON
    - Prepared and delivered three lectures per week to a class of 70 non-math students
    - Created weekly assignments, tutorials, quizzes, exams, and in-class *Kahoot!* games
    - Coordinated graduate and undergraduate teaching assistants

- *Instructor, Math 124 - Calculus and Vector Algebra for Kinesiology*   *Fall 2017*
  University of Waterloo, Waterloo, ON
    - Prepared and delivered three lectures per week to a class of 220 second-year Kinesiology students
    - Designed in-class activities and demonstrations to actively engage my students.
    - Created problems for midterm and final exams

- *Interim Instructor, Math 138 - Honours Calculus II*   *Fall 2016*
  University of Waterloo, Waterloo, ON
    - Instructed two sections of 50-100 students over a two-week period, as well as one section of 100 students for a subsequent three weeks
    - Designed and delivered three lectures per week, as well as review sessions for midterm and final exams
    - Managed tutorials and grading for a team of three graduate teaching assistants

Teaching Assistant

- *Graduate Teaching Assistant*   *2014 - 2019*
  University of Waterloo, Waterloo, ON
    - Led interactive tutorials for
        MATH 115 - Linear Algebra for Engineering
        MATH 127 - Calculus I for the Sciences
        MATH 135 - Algebra for Honours Mathematics
        MATH 148 - Advanced Calculus II
        PMATH 320 - Euclidean Geometry

    - Graded assignments and exams for the above courses, as well as
        PMATH 352 - Complex Analysis
        PMATH 450 - Lebesgue Measure and Fourier Analysis
        PMATH 451 - Measure and Integration
        MATH 647 - Foundations of Calculus I (online)

- *Undergraduate Teaching Assistant*   *2012 - 2014*
  University of Windsor, Windsor, ON
    - Led tutorials for *Real Analysis* and *Complex Analysis* for 20-40 undergraduate students
    - Graded assignments and exams for *Calculus I*; held office hours at the Math Resource Centre

Math Circles   *2017 - 2019*
Centre for Education in Mathematics and Computing (CEMC), University of Waterloo, Waterloo, ON
    - Designed three mini-courses on sequences and series, linear Diophantine equations, and graph theory.
    - Created original lecture notes, problem sets, and solutions for each mini-course.
    - Presented mini-courses to audiences of approximately 50 students in grades 9 and 10.

Private Tutor *2015 - 2018*

University of Waterloo, Waterloo, ON

  − Tutored first- and second-year students in calculus and linear algebra, both individually and in groups.

SERVICE AND VOLUNTEERING

Academic Advisor *2020 - Present*

University of Waterloo, Waterloo, ON

  − Help to inform academic decisions for first-year, Mathematical Studies, and undeclared math students
  − Support students in academic and non-academic matters
  − Participate in orientation and welcome events for new and returning students

Elected Representative, FAUW Council of Representatives *2021 - 2022*

University of Waterloo, Waterloo, ON

  − Point of contact between lecturers in the Mathematics Undergraduate Group and faculty association

Co-Organizer, Teaching Circles Program *Fall 2021*

University of Waterloo, Waterloo, ON

  − Coordinate and facilitate formative teaching evaluations for lecturers within the Faculty of Mathematics

Co-Organizer, Faculty of Mathematics Teaching Seminar *2020 - Present*

University of Waterloo, Waterloo, ON

  − Facilitate discussions on teaching pedagogy for faculty, post-docs, and graduate students in mathematics.
  − Arrange online and on-campus presentations on mathematics teaching by external faculty members

Supervisor, Online Learning Assistants (OLAs) *2020 - Present*

University of Waterloo, Waterloo, ON

  − Supervised OLAs on the development of digital assets for first- and second-year math courses
  − Projects include online assessment administration, video transcription, captioning, and editing

Host of the YouTube Math Channel [Mathemation](#) *2020 - Present*

  − Publicly feature video content from my recent mathematics courses to benefit learners worldwide

LGBTQ+ Space Maker *2020 - Present*

University of Waterloo, Waterloo, ON

  − Pledge to promote inclusivity and acceptance of LGBTQ+ individuals
  − Provide information on resources and services for members of the LGBTQ+ community

Co-Chair, MUG Mission and Vision Statement Drafting Committee *October 2020 - July 2021*

University of Waterloo, Waterloo, ON

  − Co-led a team of lecturers to draft statements representing the Math Undergraduate Group

Editorial Reviewer, MMT Capstone Projects *Spring 2021*

University of Waterloo, Waterloo, ON

  − Reviewed two Capstone projects for the Master of Mathematics for Teachers (MMT) program

Graduate Student Representative, Department of Pure Mathematics *2019 - 2020*

University of Waterloo, Waterloo, ON

  − Attended departmental meetings as voting graduate student representative

Co-Organizer, Faculty of Mathematics Graduate Teaching Seminar *2018 - 2019*

University of Waterloo, Waterloo, ON

  − Assisted in designing and facilitating a teaching seminar for new graduate student instructors
  − Provided written and verbal feedback for microteaching sessions and teaching practicums

Grader, CEMC's Canadian Senior/Intermediate Mathematics Contests (CSIMC)   *2016 - 2019*
University of Waterloo, Waterloo, ON

- Grade annual mathematics competition written by high school students in Canada and abroad

Co-Organizer and Facilitator, Faculty of Mathematics Stage 2 TA Training   *October 2019*
University of Waterloo, Waterloo, ON

- Assisted in designing and facilitating a seminar for graduate teaching assistants leading tutorials
- Topics: preparation practices, classroom delivery skills, posing effective questions, active learning

Grader, CEMC's Euclid High School Mathematics Contest   *2016 - 2019*
University of Waterloo, Waterloo, ON

- Grade annual mathematics competition written by high school students in Canada and abroad

Volunteer, Math Faculty De-Stress Event   *2018 - 2019*
University of Waterloo, Waterloo, ON

- Co-hosted trivia event for mathematics students to relieve stress before final exams

Presenter, CEMC's Math Circles Program   *2017 - 2019*
University of Waterloo, Waterloo, ON

- Designed and delivered three mini-courses on university-level mathematics for high school students
- Promoted enthusiasm for post-secondary mathematics at the University of Waterloo

Volunteer, Graduate Student Visit Day   *2016 - 2019*
University of Waterloo, Waterloo, ON

- Hosted prospective graduate students and provided information on various graduate programs

Graduate Volunteer, The Great Polytope Barn-Raising Project   *January 2019*
University of Waterloo, Waterloo, ON

- Trained and coordinated undergraduate volunteers in building a model of a 4D-polytope

Panelist, Faculty of Mathematics TA Training Event   *2017 - 2018*
University of Waterloo, Waterloo, ON

- Discussed my experience as a teaching assistant at a training event for new graduate TAs

Volunteer, Pure Mathematics Fall Orientation   *2015 - 2018*
University of Waterloo, Waterloo, ON

- Welcomed and mentored incoming graduate students to the Department of Pure Mathematics

Co-Organizer, Pure Mathematics Graduate Student Colloquium   *May 2016 - August 2018*
University of Waterloo, Waterloo, ON

- Coordinated a monthly seminar for graduate students in the Department of Pure Mathematics
- Advised student speakers in pre-event consultation, and discussed feedback following the presentation

Organizer, von Neumann Algebras Learning Seminar   *May 2016 - August 2016*
University of Waterloo, Waterloo, ON

- Organized and facilitated a learning seminar on von Neumann algebras for graduate students

Secretary, Mathematics and Statistics Student Association   *September 2013 - August 2014*
University of Windsor, Windsor, ON

- Recorded minutes in council meetings and co-organized department events

PUBLICATIONS

Cramer, Z., *Matrix Algebras with a Certain Compression Property II*, Linear Algebra and Its Applications, 2021; 619: 210-263. https://arxiv.org/abs/1904.07382

Cramer, Z., Marcoux, L.W., & Radjavi, H., *Matrix Algebras with a Certain Compression Property I*, Linear Algebra and Its Applications, 2021; 621: 50-85. https://arxiv.org/abs/1904.06803

Cramer, Z. (2020). *The Distance from a Rank $n-1$ Projection to the Nilpotent Operators on $\mathbb{C}^n$*, Canadian Mathematical Bulletin, 2020; 64(1): 1-21. https://arxiv.org/abs/1907.09635

PROFESSIONAL DEVELOPMENT

LGBTQ+ Making Spaces Program <div style="float:right">*December 2019*</div>
Human Rights, Equity and Inclusion Office, University of Waterloo, Waterloo, ON
- Attended a 3.5-hour workshop on promoting inclusivity for members of the LGBTQ+ community
- Topics included gender identity/expression, sexual identity, homophobia, heterosexism, transphobia

Certificate in University Teaching <div style="float:right">*2018*</div>
Centre for Teaching Excellence, University of Waterloo, Waterloo, ON
- Completed workshops on course design, assessment methods, interactive teaching, and student learning
- Conducted research project on active learning and flipped classrooms in undergraduate mathematics
- Strengthened my teaching abilities through feedback from faculty teaching observations

Fundamentals of University Teaching <div style="float:right">*2016*</div>
Centre for Teaching Excellence, University of Waterloo, Waterloo, ON
- Attended workshops on classroom management and delivery skills, lesson planning, active learning strategies, and effective feedback
- Prepared and delivered three microteaching sessions to participants and workshop facilitator

AWARDS AND HONOURS

WUSA Excellence in Undergraduate Teaching Award <div style="float:right">*2020*</div>
Waterloo Undergraduate Student Association (WUSA), University of Waterloo, Waterloo, ON

Award for Outstanding Teaching by a Graduate Student <div style="float:right">*2019*</div>
Department of Pure Mathematics, University of Waterloo, Waterloo, ON

Ontario Graduate Scholarship (OGS) ($15 000) <div style="float:right">*2019*</div>
University of Waterloo, Waterloo, ON

President's Graduate Scholarship ($5 000/year) <div style="float:right">*2019*</div>
University of Waterloo, Waterloo, ON

Outstanding Teaching Assistant Award <div style="float:right">*2018*</div>
Department of Pure Mathematics, University of Waterloo, Waterloo, ON

Joseph Wai-Hung Liu Graduate Scholarship ($5 000) <div style="float:right">*2017 - 2018*</div>
University of Waterloo, Waterloo, ON

Ontario Graduate Scholarship (OGS) ($15 000) <div style="float:right">*2018*</div>
University of Waterloo, Waterloo, ON

NSERC Alexander Graham Bell Postgraduate Scholarship, Doctoral (PGS D) ($21 000/year) <div style="float:right">*2015 - 2018*</div>
University of Waterloo, Waterloo, ON

President's Graduate Scholarship ($10 000/year) <div style="float:right">*2014 - 2018*</div>
University of Waterloo, Waterloo, ON

NSERC Alexander Graham Bell Canada Graduate Scholarship, Master's (CGS M) ($17 500) <div style="float:right">*2014*</div>
University of Waterloo, Waterloo, ON

NSERC Undergraduate Student Research Award (USRA) ($4 500)   *2014*
University of Windsor, Windsor, ON

Board of Governor's Medal - Mathematics   *2014*
University of Windsor, Windsor, ON

NSERC Undergraduate Student Research Award (USRA) ($4 500)   *2013*
University of Windsor, Windsor, ON

Elias Zakon Memorial Scholarship ($1 200)   *2012*
University of Windsor, Windsor, ON

NSERC Undergraduate Student Research Award (USRA) ($4 500)   *2012*
University of Windsor, Windsor, ON

Ruza Robote Memorial Award ($400)   *2011*
University of Windsor, Windsor, ON

Norman Ramm Scholarship ($600)   *2011*
University of Windsor, Windsor, ON

Board of Governor's Medal - Science   *2011*
University of Windsor, Windsor, ON

President's Honour Roll   *2010 - 2014*
University of Windsor, Windsor, ON

President's Renewable Entrance Scholarship ($16 000/year)   *2010 - 2014*
University of Windsor, Windsor, ON

PRESENTATIONS

Conference Presentations

"The Distance from Projections to Nilpotents"   *June 2019*
Canadian Operator Symposium (COSy), University of Regina, Regina, SK

"Matrix Algebras with a Certain Compression Property"   *June 2018*
Canadian Operator Symposium (COSy), University of Manitoba, Winnipeg, MB

"Matrix Algebras with a Certain Compression Property"   *May 2018*
Great Planes Operator Theory Symposium (GPOTS), Miami University, Oxford, OH

Invited Talks

"Matrix Algebras with a Certain Compression Property"   *November 2019*
Department Colloquium, University of Windsor, Windsor, ON

"The Distance from Projections to Nilpotents"   *September 2019*
Waterloo Mathematics Undergraduate Research Conference (Graduate Presenter),
University of Waterloo, Waterloo, ON

"Matrix Algebras with a Certain Compression Property"   *February 2019*
Pure Mathematics Analysis Seminar, University of Waterloo, Waterloo, ON

"Active Learning and Flipped Classrooms in Introductory Mathematics"   *June 2018*
Faculty of Mathematics Teaching Seminar, University of Waterloo, Waterloo, ON

"Active Learning and Flipped Classrooms in Introductory Mathematics"   *April 2018*
Centre for Teaching Excellence, University of Waterloo, Waterloo, ON

"The Gershgorin Circle Theorem" *February 2017*
Pure Mathematics Graduate Student Colloquium, University of Waterloo, Waterloo, ON

"The Matrix Tree Theorem" *July 2015*
Pure Mathematics/Combinatorics Joint Colloquium, University of Waterloo, Waterloo, ON

Department Learning Seminars

"Schur Products, Tensor Products, and Completely Positive Maps" *October 2016*
Operator Systems Learning Seminar, University of Waterloo, Waterloo, ON

"The von Neumann Double Commutant Theorem" *May 2016*
von Neumann Algebras Learning Seminar, University of Waterloo, Waterloo, ON

"Voiculescu's Theorem" *September 2015*
Pure Mathematics Analysis Learning Seminar, University of Waterloo, Waterloo, ON

CONFERENCES ATTENDED

Canadian Operator Symposium (COSy) *May 2020*
Fields Institute for Research in Mathematical Sciences, Toronto, ON (online)

Canadian Mathematical Society (CMS) Winter Meeting *December 2019*
Toronto, ON

Canadian Mathematical Society (CMS) Summer Meeting *June 2019*
University of Regina, Regina, SK

Canadian Operator Symposium (COSy) ∗ presenter *June 2019*
University of Regina, Regina, SK

University of Waterloo Teaching and Learning Conference *May 2019*
University of Waterloo, Waterloo, ON

Canadian Operator Symposium (COSy) ∗ presenter *June 2018*
University of Winnipeg, Winnipeg, MB

Great Planes Operator Theory Symposium (GPOTS) ∗ presenter *May 2018*
Miami University, Oxford, OH

Canadian Mathematical Society (CMS) Winter Meeting *December 2017*
University of Waterloo, Waterloo, ON

Canadian Operator Symposium (COSy) *May 2017*
Lakehead University, Thunder Bay, ON

Great Planes Operator Theory Symposium (GPOTS) *May 2017*
Texas Christian University, Fort Worth, TX

Canadian Operator Symposium (COSy) *May 2016*
Université de Montréal, Montreal, QB

Canadian Mathematical Society (CMS) Winter Meeting *December 2015*
Univesité du Québec à Montréal, Montreal, QB

Canadian Operator Symposium (COSy) *June 2015*
University of Waterloo, Waterloo, ON

TECHNICAL SKILLS

- Efficient typesetting with LaTeX
- Basics of Maple and Python programming
- Microsoft Office Suite