

CONTACT INFORMATION	1805 Spruce St, Apt E Boulder, CO 80302 USA	tel: 212-308-4134 url: williamdemeo.org email: williamdemeo@gmail.com
RESEARCH INTERESTS	Universal algebra, logic, category theory, type theory, complexity, programming languages. <i>Applications:</i> proof mechanization in Lean & Coq, big data analysis in Scala/Spark, machine learning.	
EDUCATION	Doctor of Philosophy in Mathematics University of Hawai‘i at Mānoa 2012 Thesis: Congruence lattices of finite algebras Advisor: Ralph Freese Master of Science in Mathematics New York University, Courant Institute 1998 Thesis: Approximating eigenvalues of large stochastic matrices Advisor: Jonathan Goodman Bachelor of Arts in Economics University of Virginia 1994	
ACADEMIC APPOINTMENTS	Postdoctoral Researcher Algebra Dept, Charles University, Prague 2019– Burnett Meyer Instructor Mathematics Dept, University of Colorado, Boulder 2017–2019 Visiting Assistant Professor Mathematics Dept, University of Hawai‘i at Mānoa 2016–2017 Postdoctoral Associate Mathematics Dept, Iowa State University, Ames 2014–2016 Visiting Assistant Professor Mathematics Dept, Univ. South Carolina, Columbia 2012–2014	
PROFESSIONAL EXPERIENCE	Senior Research Scientist Textron Systems Corporation 2001–2006 Role: algorithm design and complexity analysis for image processing and dsp research.	
GRANTS & AWARDS	NSF Research Grant (no. 1500218) 2015–2018 Project Title: <i>Algebras and algorithms, structure and complexity theory</i> Role: postdoctoral fellow on a team with 6 senior scientists and 3 postdocs Description: 3-yr collaborative research on algebraic approaches to constraint satisfaction problems Magellan Scholar Grant 2013–2014 Project Title: <i>What does a nonabelian group sound like?</i> Role: faculty mentor for undergraduate research Description: see soundmath.github.io/GroupSound/GroupSound ARCS Sarah Ann Martin Award for Outstanding Research in Mathematics Honolulu 2011 Best Paper Award , International Symposium on Musical Acoustics Nara 2004	
PUBLICATIONS	<i>Journal Articles</i> <ol style="list-style-type: none"> Bounded homomorphisms and finitely generated fiber products of lattices, with P. Mayr and N. Ruskuc; submitted for publication in <i>International Journal of Algebra & Computation (IJAC)</i>; preprint link: arXiv:1907.08046 [math.LO] Universal algebraic methods for constraint satisfaction problems, with Clifford Bergman; accepted for publication in <i>Logical Methods in Computer Science (LMCS)</i>; preprint link: arXiv [cs.LO] 1611.02867 Polynomial-time tests for difference terms in idempotent varieties, with Freese and Valeriote; accepted for publication in <i>International Journal of Algebra & Computation (IJAC)</i>; preprint link: diffTerm-ijac-draft-195036.pdf Isotopic algebras with nonisomorphic congruence lattices <i>Algebra Universalis</i> 72:295–298, 2014; preprint link: Isotopy-AU-2014.pdf Expansions of finite algebras and their congruence lattices <i>Algebra Universalis</i> 69:257–278, 2013; preprint link: DeMeo-Expansions-AU-2013.pdf 	

Refereed Conference Proceedings

6. [Proceedings of Algebras and Lattices in Hawaii 2018](#) editor with K. Adaricheva, J. Hyndman; [preprint link](#).
7. [Topics in nonabelian harmonic analysis and DSP applications](#) *Proceedings of the International Symposium on Musical Acoustics* Nara, Japan 2004 (best paper award); [preprint link](#).
8. [Characterizing musical signals with Wigner-Ville interferences](#) *Proceedings of the International Computer Music Conference (ICMC)*; Göteborg, Sweden 2002; [preprint link](#).
9. [Approximating eigenvalues of large stochastic matrices](#) *Proceedings of the 8th Copper Mt. Conference on Iterative Methods* Colorado, USA 1998 [preprint link](#).

Papers in Progress

[Representing finite lattices as congruence lattices of finite algebras](#), with R. Freese and P. Jipsen.

Books in Progress

[Category Theory: a concise course](#)[‡] with Charlotte Aten and Venanzio Capretta.

[Categories & Algebras & Types in Action](#): with computer-aided proofs, with Hyeyoung Shin.

[Complex Analysis Exams](#)[‡]

[Real Analysis Exams](#)[‡]

[‡] Draft available at mathematicalanalysis.org.

SUMMER SCHOOLS
ATTENDED

Oregon Programming Languages Summer School	University of Oregon
Topics: parallelism and concurrency	July 3–21, 2018
Computer-aided Mathematical Proof	Cambridge University
Topics: bringing proof technology into mainstream mathematics	July 10–14, 2017
Oregon Programming Languages Summer School	University of Oregon
Topics: dependent, gradual, substructural type systems	June 26–July 8, 2017
Midlands Graduate School in the Foundations of Computing Science	University of Birmingham
Topics: type theory, denotational semantics, category theory	April 11–15, 2016
Oregon Programming Languages Summer School	University of Oregon
Topics: type theory, logic, semantics, verification	June 16–28, 2014
Midlands Graduate School in the Foundations of Computing Science	University of Nottingham
Topics: simply typed lambda calculus, domain theory, category theory	April 22–26, 2014
LMS/EPSRC Short Course in Computational Group Theory	University of St. Andrews
Topics: permutation & finitely presented groups, constructive recognition	Jul 29–Aug 2, 2013
NATO ASI on Computational Noncommutative Algebra	Il Ciocco, Italy, 2003

DATA SCIENCE
CREDENTIALS

Big Data Analysis with Scala and Spark	École Polytechnique Fédérale de Lausanne
4-week Coursera course; grade: 93.4%	Verified Certificate earned 24 Nov 2017
Functional Programming Principles in Scala	École Polytechnique Fédérale de Lausanne
6-week Coursera course; grade: 100%	Verified Certificate earned 17 Nov 2016
Functional Program Design in Scala	École Polytechnique Fédérale de Lausanne
4-week Coursera course; grade: 100%	Verified Certificate earned 6 Aug 2016
Parallel Programming in Scala	École Polytechnique Fédérale de Lausanne
4-week Coursera course; grade: 100%	Verified Certificate earned 27 Jun 2016
Startup Engineering	Stanford University
12-week Coursera course; grade: 99.3%	Verified Certificate earned 23 Sep 2013

SYNERGISTIC
ACTIVITIES

Organizer, BLAST 2019 Conference	Boulder 2019
Organizer, Algebras and Lattices in Hawai'i Conf. to honor Freese, Lampe & Nation	Honolulu 2018
Organizer, Workshop on Computational Universal Algebra	Louisville 2013
Referee for <i>Algebra Universalis</i> , <i>Order</i> , and <i>J. Logic & Analysis</i>	2012–present
Editor for <i>Algebra Universalis</i>	2018–present

University of Colorado, Boulder

Served on doctoral candidacy exam committee for the following ph.d. students:

Jordan DuBeau; exam topics: group theory, model theory, set theory.

Ali Latfi; exam topics: category theory, commutative algebra, model theory.

Athena Sparks; exam topics: computability theory, group theory, model theory.

Michael Wheeler; exam topics: category theory, model theory, set theory.

Served on dissertation defense committee for

Jeffrey Shriner; thesis title: Hardness results for the subpower membership problem.

Iowa State University

REU mentor for Charlotte Aten (mathematics major, University of Rochester)

Honors thesis advisor for Joshua Thompson (mathematics major, honors program)

Putnam Exam mentor at weekly exam practice meetings

Undergraduate Tea cohost of weekly undergraduate student gatherings

Iowa 4-H Youth Conference volunteer mentor ([link](#))

University of South Carolina

Honors thesis mentor for Matthew Corley (computer science major, honors program)

South Carolina High School Math Contest exam design committee

Faculty mentor for Pi Mu Epsilon (math honors society)

TEACHING
EXPERIENCE

University of Colorado, Boulder (as Burnett Meyer Instructor)

Math 2001: Discrete Mathematics	Spring 2019
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Math 2001: Discrete Mathematics	Fall 2018
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Math 3140: Abstract Algebra	Fall 2018
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Math 6000: Model Theory (graduate course)	Spring 2018
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Math 2130: Linear Algebra	Spring 2018
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Math 2130: Linear Algebra	Fall 2017
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University of Hawaii (as Visiting Assistant Professor)

Math 215: Applied Calculus	Spring 2017
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Math 480: Senior Seminar	Spring 2017
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Math 244: Calculus IV	Fall 2016
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Math 321: Introduction to Advanced Math	Fall 2016
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Iowa State University (as Postdoctoral Associate)

Math 317: Linear Algebra	Spring 2016
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Math 317: Linear Algebra	Fall 2015
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Math 160: Survey of Calculus	Fall 2015
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Math 207: Elementary Linear Algebra	Spring 2015
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Math 165: Calculus I	Spring 2015
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Math 301: Abstract Algebra	Fall 2014
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Math 165: Calculus I	Fall 2014
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University of South Carolina (as Visiting Assistant Professor)

Math 700: Linear Algebra (graduate course)	Spring 2014
Math 141: Calculus I	Spring 2014
Math 374: Discrete Structures	Fall 2013
Math 122: Calculus for Business and Social Sciences	Fall 2013
Math 374: Discrete Structures	Spring 2013
Math 122: Calculus for Business and Social Sciences	Spring 2013
Math 241: Vector Calculus	Fall 2012
Math 122: Calculus for Business and Social Sciences	Fall 2012

University of Hawaii (as Graduate Student Instructor)

Math 371: Probability Theory	Summer 2011
Math 215: Applied Calculus I	Summer 2009
Math 100: Mathematical Reasoning	Summer 2010

TALKS

<i>Computing Difference Term Operations in Polynomial Time</i> BLAST Conference, University of Denver	Denver, CO 2018
<i>Why Universal Algebra Needs Inductive, Dependent Types</i> Oregon Programming Languages Summer School	Eugene, OR 2018
<i>A Tutorial Introduction to the Lean Prover</i> University of Colorado Logic Seminar	Boulder, CO 2018
<i>The Lambda Calculus and Dependent Type Theory</i> University of Colorado Logic Seminar	Boulder, CO 2018
<i>Representing Finite Lattices as Congruence Lattices</i> (slides) Colorado State University Algebra Seminar	Fort Collins, CO 2017
<i>Algebraic Approach to Complexity of Constraint Satisfaction Problems</i> (slides) University of Hawaii Logic and Analysis Seminar	Honolulu, HI 2016
<i>Universal Algebraic Methods for Constraint Satisfaction Problems</i> AMS Fall Western Sectional Meeting: Special Session in Algebraic Logic	Denver, CO 2016
<i>The Rectangularity Theorem of Barto and Kozik</i> (slides) Algebras and Algorithms: Structure and Complexity Theory	Boulder, CO 2016
<i>Constraint Satisfaction Problems and Universal Algebra</i> (slides) Midlands Graduate School in the Foundation of Computing Science	Birmingham, GBR 2016
<i>Permutability in Diamonds</i> Iowa State Algebra and Combinatorics Seminar	Ames, IA 2016
<i>Which Commutative Idempotent Binars are Tractable?</i> (slides) Vanderbilt Shanks workshop: Open Problems in Universal Algebra	Nashville, TN 2015
<i>Some Small Finite Algebras Yielding Tractable CSP Templates</i> Iowa State Algebra and Combinatorics Seminar	Ames, IA 2015
<i>Algebraic CSP and Tractability of Commutative Idempotent Binars</i> (slides) BLAST Conference, University of North Texas	Denton, TX 2015
<i>Isotopic Algebras</i> Iowa State Algebra and Combinatorics Seminar	Ames, IA 2015

TALKS (CONTINUED)	<i>What Does a Nonabelian Group Sound Like?</i> (slides) MAA Special Session: At the Intersection of Mathematics and the Arts	Baltimore, MD 2014
	<i>Interval Enforceable Properties of Finite Groups</i> (slides) AMS Special Session on Finite Universal Algebra	Louisville, KY 2013
	<i>Tutorial: UACalc at the command line and in the cloud</i> Workshop on Computational Universal Algebra	Louisville, KY 2013
	<i>Approximating Eigenvalues of Large Stochastic Matrices</i> University of South Carolina Combinatorics Seminar	Columbia, SC 2013
	<i>Congruence Lattices of Finite Algebras (plenary lecture)</i> (slides) BLAST Conference, Chapman University	Orange, CA 2013
	<i>Transposition Principles for Subgroups and Equivalence Relations</i> (slides) Zassenhaus Group Theory Conference	Asheville, NC 2013
	<i>Isotopic Algebras with Nonisomorphic Congruence Lattices</i> (slides) AMS Special Session on Algebras, Lattices, and Varieties	Boulder, CO 2013
	<i>Synchronizing Automata and the Černý Conjecture</i> (slides) Graduate Algebra Seminar, University of Colorado	Boulder, CO 2013
	<i>The Finite Lattice Representation Problem in Four Parts</i> University of South Carolina Algebra and Logic Seminar	Columbia, SC 2012
	<i>Interval Sublattice Enforceable Properties of Finite Groups</i> (slides) The 31st Ohio State-Denison Mathematics Conference	Columbus, OH 2012
	<i>Expansions of Finite Algebras and their Congruence Lattices</i> (slides) American Mathematical Society sectional meeting	Honolulu, HI 2012
	<i>Intervals in Subgroup Lattices and Permutation Representations</i> Western Carolina University Group Theory Seminar	Cullowhee, NC 2012
	<i>Recent Progress on the Finite Lattice Representation Problem</i> Achievement Rewards for College Scientists: Scholar Presentations	Honolulu, HI 2011
	<i>The Finite Lattice Representation Problem</i> First Joint Meeting of the Korean and American Mathematical Societies	Seoul, KOR 2009

REFERENCES

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