

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 Thesis: <i>Congruence lattices of finite algebras</i> . Advisor: Ralph Freese	2012
	Master of Science in Mathematics, New York University Courant Institute Thesis: <i>Approximating eigenvalues of large stochastic matrices</i> . Advisor: Jonathan Goodman	1998
	Bachelor of Arts in Economics, University of Virginia	1994
ACADEMIC APPOINTMENTS	Burnett Meyer Instructor, University of Colorado, Boulder	2017–2019
	Visiting Assistant Professor, University of Hawaii, Honolulu	2016–2017
	Post-doctoral Associate, Iowa State University, Ames	2014–2016
	Visiting Assistant Professor, University of South Carolina, Columbia	2012–2014
PROFESSIONAL EXPERIENCE	Senior Research Scientist, Textron Systems Corporation Role: algorithm design and complexity analysis for image processing and dsp research.	2001–2006
GRANTS & AWARDS	NSF Research Grant (no. 1500218) 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	2015–2018
	Magellan Scholar Grant Project Title: <i>What does a nonabelian group sound like?</i> Role: faculty mentor for undergraduate research Description: available at soundmath.github.io/GroupSound/GroupSound	2013–2014
	ARCS Sarah Ann Martin Award for Outstanding Research in Mathematics	2011
	Best Paper Award, International Symposium on Musical Acoustics	2004
PUBLICATIONS	<p><i>Journal Articles</i></p> <ol style="list-style-type: none"> 1. Universal algebraic methods for constraint satisfaction problems, with Clifford Bergman; to appear in <i>Logical Methods in Computer Science (LMCS)</i>; preprint link: arXiv [cs.LO] 1611.02867 2. Polynomial-time tests for difference terms in idempotent varieties, with Freese and Valeriote; to appear in <i>International Journal of Algebra & Computation (IJAC)</i>; preprint link: diffTerm-ijac-r1-draft-20180905.pdf 3. Isotopic algebras with nonisomorphic congruence lattices (sole author) <i>Algebra Universalis</i> 72:295–298, 2014; preprint link: Isotopy-AU-2014.pdf 4. Expansions of finite algebras and their congruence lattices (sole author) <i>Algebra Universalis</i> 69:257–278, 2013; preprint link: DeMeo-Expansions-AU-2013.pdf <p><i>Refereed Conference Proceedings</i></p> <ol style="list-style-type: none"> 5. Proceedings of Algebras and Lattices in Hawaii 2018, editor with K. Adaricheva, J. Hyndman. 6. Topics in nonabelian harmonic analysis and DSP applications, Proceedings of the International Symposium on Musical Acoustics, Nara, Japan 2004 (best paper award). 7. Characterizing musical signals with Wigner-Ville interferences, Proceedings of the International Computer Music Conference, Göteborg, Sweden 2002. 8. Approximating eigenvalues of large stochastic matrices, Proceedings of the 8th Copper Mt. Conference on Iterative Methods, Colorado, USA 1998. 	

Papers in Progress

Representing finite lattices as congruence lattices of finite algebras, with R. Freese and P. Jipsen.
Draft available at github.com/UniversalAlgebra/fin-lat-rep

Books in Progress

Algebras, Categories and Types: with computer-aided proofs, with Hyeyoung Shin.

A Concise Course in Category Theory, with Charlotte Aten and Venanzio Capretta.

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
DATA SCIENCE CREDENTIALS	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
	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
SYNERGISTIC ACTIVITIES	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
	Organizer: <i>Algebras and Lattices in Hawai‘i Conf. to honor Freese, Lampe & Nation</i>	Honolulu 2018
	Organizer: <i>Workshop on Computational Universal Algebra</i>	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

Math 2001: Discrete Mathematics Fall 2018

[Math 3140: Abstract Algebra](#) Fall 2018[Math 6000: Model Theory \(graduate course\)](#) Spring 2018[Math 2130: Linear Algebra](#) Spring 2018

Math 2130: Linear Algebra Fall 2017

University of Hawaii (as Visiting Assistant Professor)

Math 215: Applied Calculus Spring 2017

Math 480: Senior Seminar Spring 2017

[Math 244: Calculus IV](#) Fall 2016[Math 321: Introduction to Advanced Math](#) Fall 2016**Iowa State University** (as Postdoctoral Associate)[Math 317: Linear Algebra](#) Spring 2016

Math 317: Linear Algebra Fall 2015

[Math 160: Survey of Calculus](#) Fall 2015[Math 207: Elementary Linear Algebra](#) Spring 2015[Math 165: Calculus I](#) Spring 2015

Math 301: Abstract Algebra Fall 2014

Math 165: Calculus I Fall 2014

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
	<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

TALKS (CONTINUED)	<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

Ralph Freese

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