

CONTACT INFORMATION	1805 Spruce St, Apt E Boulder, CO 80302 USA	tel: 212-308-4134 url: <a href="http://williamdemeo.org">williamdemeo.org</a> email: <a href="mailto:williamdemeo@gmail.com">williamdemeo@gmail.com</a>
RESEARCH INTERESTS	Universal algebra, lattice theory, logic, computational complexity, category theory, type theory, programming languages. <i>Applications:</i> Computer-aided theorem proving with Lean and Coq, Big Data analysis with Scala/Spark, Blockchain technologies and functional programming.	
EDUCATION	Doctor of Philosophy in Mathematics, University of Hawai'i at Mānoa 2012 Thesis: <i>Congruence lattices of finite algebras</i> . Advisor: Ralph Freese Master of Science in Mathematics, New York University Courant Institute 1998 Thesis: <i>Approximating eigenvalues of large stochastic matrices</i> . Advisor: Jonathan Goodman 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 2001–2006 Role: image processing and dsp research; algorithm design and complexity analysis	
GRANTS & AWARDS	NSF Research Grant (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: available at <a href="http://soundmath.github.io/GroupSound/GroupSound">soundmath.github.io/GroupSound/GroupSound</a> ARCS Sarah Ann Martin Award for Outstanding Research in Mathematics 2011 Best Paper Award, International Symposium on Musical Acoustics 2004	
PUBLICATIONS	<i>Journal Articles</i> <ol style="list-style-type: none"> <li><a href="#">Universal algebraic methods for constraint satisfaction problems</a>, with Clifford Bergman; to appear in <i>Logical Methods in Computer Science (LMCS)</i>; preprint link: <a href="#">arXiv [cs.LO] 1611.02867</a></li> <li><a href="#">Polynomial-time tests for difference terms in idempotent varieties</a>, with Freese and Valeriote; to appear in <i>International Journal of Algebra &amp; Computation (IJAC)</i>; preprint link: <a href="#">diffTerm-ijac-r1-draft-20180905.pdf</a></li> <li><a href="#">Isotopic algebras with nonisomorphic congruence lattices</a> (sole author) <i>Algebra Universalis</i> <b>72</b>:295–298, 2014; preprint link: <a href="#">Isotopy-AU-2014.pdf</a></li> <li><a href="#">Expansions of finite algebras and their congruence lattices</a> (sole author) <i>Algebra Universalis</i> <b>69</b>:257–278, 2013; preprint link: <a href="#">DeMeo-Expansions-AU-2013.pdf</a></li> </ol> <i>Refereed Conference Proceedings</i> <ol style="list-style-type: none"> <li><a href="#">Proceedings of Algebras and Lattices in Hawaii 2018</a>, editor with K. Adaricheva, J. Hyndman.</li> <li><a href="#">Topics in nonabelian harmonic analysis and DSP applications</a>, Proceedings of the International Symposium on Musical Acoustics, Nara, Japan 2004 (best paper award).</li> <li><a href="#">Characterizing musical signals with Wigner-Ville interferences</a>, Proceedings of the International Computer Music Conference, Göteborg, Sweden 2002.</li> <li><a href="#">Approximating eigenvalues of large stochastic matrices</a>, Proceedings of the 8th Copper Mt. Conference on Iterative Methods, Colorado, USA 1998.</li> </ol>	

## Papers in Progress

*A new characterization of fiber products of lattices*, with P. Mayr and N. Ruskuc.

Draft available at [github.com/UniversalAlgebra/fg-fin-lat](https://github.com/UniversalAlgebra/fg-fin-lat)

*Representing finite lattices as congruence lattices of finite algebras*, with R. Freese and P. Jipsen.

Draft available at [github.com/UniversalAlgebra/fin-lat-rep](https://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.

*Problems in Real and Complex Analysis*.

*Problems in Groups and Rings*.

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

DATA SCIENCE CREDENTIALS	<a href="#">Big Data Analysis with Scala and Spark</a>	École Polytechnique Fédérale de Lausanne
	4-week Coursera course; grade: 93.4%	<a href="#">Verified Certificate</a> earned 24 Nov 2017
	<a href="#">Functional Programming Principles in Scala</a>	École Polytechnique Fédérale de Lausanne
	6-week Coursera course; grade: 100%	<a href="#">Verified Certificate</a> earned 17 Nov 2016
	<a href="#">Functional Program Design in Scala</a>	École Polytechnique Fédérale de Lausanne
	4-week Coursera course; grade: 100%	<a href="#">Verified Certificate</a> earned 6 Aug 2016
SYNERGISTIC ACTIVITIES	<a href="#">Parallel Programming in Scala</a>	École Polytechnique Fédérale de Lausanne
	4-week Coursera course; grade: 100%	<a href="#">Verified Certificate</a> earned 27 Jun 2016
	<a href="#">Startup Engineering</a>	Stanford University
SYNERGISTIC ACTIVITIES	12-week Coursera course; grade: 99.3%	<a href="#">Verified Certificate</a> earned 23 Sep 2013

SYNERGISTIC ACTIVITIES	Organizer: <i>Algebras and Lattices in Hawai‘i Conf. to honor Freese, Lampe &amp; Nation</i>	Honolulu 2018
	Organizer: <i>Workshop on Computational Universal Algebra</i>	Louisville 2013
	Editor for <i>Algebra Universalis</i> mathematics journal	2018–present
	Referee for <i>Algebra Universalis</i> , <i>Order</i> , and <i>J. Logic &amp; Analysis</i>	2012–present
	Founder/editor: <a href="https://universalalgebra.org">universalalgebra.org</a>	2013–present

## University of Colorado, Boulder

Ph.D. Preliminary Exam Committee for Jordan DuBeau, Ali Latfi, Athena Sparks, Michael Wheeler

Ph.D. Thesis Defense Committee for Jeffrey Shriner

Honors Thesis Defense Committee for Zetong Xue

## 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)

Updated Wednesday 9<sup>th</sup> January, 2019

**University of Colorado, Boulder** (as Burnett Meyer Instructor)

Math 2001: Discrete Mathematics	Spring 2019
<a href="#">Math 2001: Discrete Mathematics</a>	Fall 2018
<a href="#">Math 3140: Abstract Algebra</a>	Fall 2018
<a href="#">Math 6000: Model Theory (graduate course)</a>	Spring 2018
<a href="#">Math 2130: Linear Algebra</a>	Spring 2018
Math 2130: Linear Algebra	Fall 2017

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**University of Hawaii** (as Visiting Assistant Professor)

Math 215: Applied Calculus	Spring 2017
Math 480: Senior Seminar	Spring 2017
<a href="#">Math 244: Calculus IV</a>	Fall 2016
<a href="#">Math 321: Introduction to Advanced Math</a>	Fall 2016

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**Iowa State University** (as Postdoctoral Associate)

<a href="#">Math 317: Linear Algebra</a>	Spring 2016
Math 317: Linear Algebra	Fall 2015
<a href="#">Math 160: Survey of Calculus</a>	Fall 2015
<a href="#">Math 207: Elementary Linear Algebra</a>	Spring 2015
<a href="#">Math 165: Calculus I</a>	Spring 2015
Math 301: Abstract Algebra	Fall 2014
Math 165: Calculus I	Fall 2014

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**University of South Carolina** (as Visiting Assistant Professor)

<a href="#">Math 700: Linear Algebra (graduate course)</a>	Spring 2014
<a href="#">Math 141: Calculus I</a>	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

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**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	<p><b>Ralph Freese</b> Professor of Mathematics University of Hawaii 2565 McCarthy Mall Honolulu, HI 96822 phone: 808-956-4680 email: <a href="mailto:ralph@math.hawaii.edu">ralph@math.hawaii.edu</a></p> <p><b>George McNulty</b> Professor of Mathematics University of South Carolina 1523 Greene Street Columbia, SC 29208 phone: 803-777-7469 email: <a href="mailto:mcnulty@math.sc.edu">mcnulty@math.sc.edu</a></p> <p><b>Peter Jipsen</b> Professor of Mathematics Chapman University 545 W. Palm Ave Orange, CA 92866 phone: 714-744-7918 email: <a href="mailto:jipsen@chapman.edu">jipsen@chapman.edu</a></p> <p><b>J.B. Nation</b> Emeritus Professor of Mathematics University of Hawaii 2565 McCarthy Mall Honolulu, HI 96822 phone: 808-956-4680 email: <a href="mailto:jb@math.hawaii.edu">jb@math.hawaii.edu</a></p>	<p><b>Clifford Bergman</b><sup>†</sup> Professor of Mathematics Iowa State University 396 Carver Hall Ames, Iowa 50011 phone: 515-294-1752 email: <a href="mailto:cbergman@iastate.edu">cbergman@iastate.edu</a></p> <p><b>Peter Mayr</b><sup>†</sup> Assistant Professor of Mathematics University of Colorado, Boulder 2300 Colorado Avenue Boulder, CO 80309 phone: 303-492-7754 email: <a href="mailto:peter.mayr@colorado.edu">peter.mayr@colorado.edu</a></p> <p><b>Agnes Szendrei</b><sup>†</sup> Professor of Mathematics University of Colorado, Boulder 2300 Colorado Avenue Boulder, CO 80309 phone: 303-492-7683 email: <a href="mailto:szendrei@colorado.edu">szendrei@colorado.edu</a></p> <p><b>Bill Lampe</b><sup>†</sup> Emeritus Professor of Mathematics University of Hawaii 2565 McCarthy Mall Honolulu, HI 96822 phone: 808-956-4680 email: <a href="mailto:bill@math.hawaii.edu">bill@math.hawaii.edu</a></p>
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<sup>†</sup> teaching reference