

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 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 Visiting Assistant Professor, University of Hawaii, Honolulu Post-doctoral Associate, Iowa State University, Ames Visiting Assistant Professor, University of South Carolina, Columbia	2017–2019 2016–2017 2014–2016 2012–2014
PROFESSIONAL EXPERIENCE	Senior Research Scientist, Textron Systems Corporation Role: image processing and dsp research; algorithm design and complexity analysis	2001–2006
GRANTS & AWARDS	NSF Research Grant (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 <a href="https://soundmath.github.io/GroupSound/GroupSound">soundmath.github.io/GroupSound/GroupSound</a>	2013–2014
	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="#">Polynomial-time tests for difference terms in idempotent varieties</a>, with Freese and Valeriote; <i>Intl. J. Alg. &amp; Comp. (IJAC)</i>; preprint link: <a href="https://github.com/UniversalAlgebra/term-conditions">github.com/UniversalAlgebra/term-conditions</a></li> <li><a href="#">Universal algebraic methods for constraint satisfaction problems</a>, with Clifford Bergman; <i>Logical Methods in Computer Science (LMCS)</i>; preprint link: <a href="https://arxiv.org/abs/cs.LO">arXiv [cs.LO]</a></li> <li><a href="#">Isotopic algebras with nonisomorphic congruence lattices</a>, <i>Algebra Universalis</i> <b>72</b>:295–298, 2014; preprint link: <a href="https://github.com/williamdemeo/Isotopy">github.com/williamdemeo/Isotopy</a></li> <li><a href="#">Expansions of finite algebras and their congruence lattices</a>, <i>Algebra Universalis</i> <b>69</b>:257–278, 2013; preprint link: <a href="https://github.com/williamdemeo/Overalgebras">github.com/williamdemeo/Overalgebras</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
	<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
	NATO ASI on Computational Noncommutative Algebra	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
	<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
	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
	Guest editor for math journal: <i>Algebra Universalis</i>	2018–present
	Referee for math journals: <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
	<b>University of Colorado, Boulder</b>	
	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	
	<b>Iowa State University</b>	
	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 ( <a href="#">link</a> )	
	<b>University of South Carolina</b>	
	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)	

**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