William DeMeo

Curriculum Vitæ

Contact Information

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Research Interests

Universal algebra, lattice theory, computational complexity, type theory, programming languages.

Education

Doctor of Philosophy in Mathematics, University of Hawaii 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

Post-doctoral Associate, Iowa State University, Ames 2014–2016

Visiting Assistant Professor, University of South Carolina, Columbia 2012–2014

Instructor and Teaching Assistant, University of Hawaii, Honolulu 2008–2012

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: "Algebras and algorithms, structure and complexity theory"
Role: post-doctoral fellow on a team with 6 senior personnel and 3 post-docs.
Description: 3-yr collaborative research on algebraic approach to constraint sat problems.

Magellan Scholar Grant 2013–2014
Project Title: "What does a nonabelian group sound like?"
Role: co-authored grant proposal; mentored and directed undergraduate research.
Description available at soundmath.github.io/GroupSound/GroupSound.

ARCS Sarah Ann Martin Award for Outstanding Research in Mathematics 2011

Best Paper Award, International Symposium on Musical Acoustics 2004

Publications

Journal Articles

Isotopic algebras with nonisomorphic congruence lattices, *Algebra Universalis* **72**:295–298, 2014.
Available at github.com/williamdemeo/Isotopy

Expansions of finite algebras and their congruence lattices, *Algebra Universalis* **69**:257–278, 2013.
Available at github.com/williamdemeo/Overalgebras

Conference Proceedings

Topics in nonabelian harmonic analysis and DSP applications, *Proceedings of the International Symposium on Musical Acoustics*, Nara, JAPAN 2004 (best paper award).

Characterizing musical signals with Wigner-Ville interferences, *Proceedings of the International Computer Music Conference*, Göteborg, SWEDEN 2002.

Approximating eigenvalues of large stochastic matrices, *Proceedings of the 8th Copper Mt. Conference on Iterative Methods*, Colorado, USA 1998.

Submitted or in preparation

Interval enforceable properties of finite groups (submitted)
Preprint available at github.com/williamdemeo/IEProps

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

Algebraic methods for constraint satisfaction problems, with C. Bergman.
Draft available at github.com/UniversalAlgebra/algebraic-csp

Teaching Experience

Iowa State University

Math 317: Linear Algebra (link to course)	Spring 2016
Math 317: Linear Algebra	Fall 2015
Math 160: Survey of Calculus (link to course)	Fall 2015
Math 207: Elementary Linear Algebra (link to course)	Spring 2015
Math 165: Calculus I (link to course)	Spring 2015
Math 301: Abstract Algebra (link to course)	Fall 2014
Math 165: Calculus I	Fall 2014

University of South Carolina

Math 700: Linear Algebra (graduate level) (link to course)	Spring 2014
Math 141: Calculus I (link to course)	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 (Lecturer)

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

University of Hawaii (Teaching Assistant)

Math 242: Calculus II (for Profs. Ramsey, Watanabe, Zelenyuk)	Spring, Fall 2011
Math 242: Calculus II (for Profs. Guerzhoy, Ramsey)	Spring, Fall 2010
Math 241: Calculus I (for Prof. William Lampe)	Fall 2009
Math 242: Calculus II (for Profs. Broadhead, Dovermann, Ortel)	Spring, Fall 2009
Math 241: Calculus I (for Prof. Thomas Hoover)	Fall 2008

Synergistic Activities

Referee for mathematical journals *Algebra Universalis* and *Order*	2012–present
Founder/editor: universalalgebra.org	2013–present
Co-founder/co-organizer: *Workshop on Computational Universal Algebra*	Louisville 2013

Iowa State University *faculty mentoring activities*

REU co-mentor to Charlotte Aten (mathematics major, University of Rochester) — Summer 2016
Research topics: category theory, lattice theory, Boolean algebras with operators

Honors thesis mentor to Joshua Thompson (mathematics major, honors program) — 2014-present
Thesis topic: absorption properties of commutative idempotent binars

Putnam Exam co-mentor at weekly meetings to help students prepare for test	2014-2015
Iowa High School Math Contest volunteer proctor	2015
Undergraduate Tea co-organizer of informal weekly gatherings for undergraduates	2014-2015
Iowa 4-H Youth Conference volunteer mentor (link)	2015, 2016

University of South Carolina

South Carolina High School Math Contest exam problem selection committee	2012–2014
Faculty mentor for Pi Mu Epsilon (undergraduate math honor society)	2012–2014
Faculty mentor for student research	2013–2014

Advisee: Matthew Corley (Computer Science major in Honors College)
Project title: *What does a nonabelian group sound like?*

University of Hawaii

Working Group on Graduate Education — 2010–2011
Graduate Student Representative on committee of deans and department heads; helped draft resolution for Committee on Research and Graduate Education.

Graduate Student Organization: — 2009–2011
Faculty Senate Student Rep., Academic Committee Chair, Math Department Rep.

Mentor for Undergraduate Research: Mathematical Biology Program — 2008
Mentored students in math and dsp for classifying marine life audio signals.

Summer Schools Attended

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

Other Training

Parallel Programming in Scala — École Polytechnique Fédérale de Lausanne
4-week online course — Verified Certificate earned June 27, 2016

Functional Programming Principles in Scala — École Polytechnique Fédérale de Lausanne
7-week online course — Verified Certificate earned June 28, 2014

Startup Engineering — Stanford University
12-week online course — Verified Certificate earned Sept 23, 2013

Talks

(Slides for some of the talks listed below are available at github.com/williamdemeo/Talks)

"The Rectangularity Theorem of Barto and Kozik" (link to slides) — Boulder 2016
Algebras and Algorithms: Structure and Complexity Theory

"Constraint Satisfaction Problems and Universal Algebra" (link to slides) — Boulder 2016
Algebras and Algorithms: Structure and Complexity Theory

"Permutability in diamonds" Iowa State Algebra and Combinatorics Seminar — Ames 2016

"Which commutative idempotent binars are tractable?" (link to slides) — Nashville 2015
Vanderbilt Shanks workshop: Open Problems in Universal Algebra

"Some small finite algebras yielding tractable CSP templates" — Ames 2015
Iowa State Algebra and Combinatorics Seminar

"Algebraic CSP and tractability of commutative idempotent binars" (link to slides) — Denton 2015
BLAST Conference, University of North Texas

"Isotopic algebras" Iowa State Algebra and Combinatorics Seminar — Ames 2015

"What does a nonabelian group sound like?" (link to slides) — Baltimore 2014
MAA Special Session: At the Intersection of Mathematics and the Arts

"Interval enforceable properties of finite groups" (link to slides) — Louisville 2013
AMS Special Session on Finite Universal Algebra

"Tutorial: UACalc at the command line and in the cloud" — Louisville 2013
Workshop on Computational Universal Algebra

"Approximating eigenvalues of large stochastic matrices" — Columbia 2013
University of South Carolina Combinatorics Seminar

"Congruence lattices of finite algebras" (plenary lecture) (link to slides) — Orange 2013
BLAST Conference, Chapman University

"Transposition principles for subgroups and equivalence relations" (link to slides) — Asheville 2013
Zassenhaus Group Theory Conference

"Isotopic algebras with nonisomorphic congruence lattices" (link to slides) — Boulder 2013
AMS Special Session on Algebras, Lattices, and Varieties

"Synchronizing Automata and the Černý Conjecture" (link to slides) — Boulder 2013
Graduate Algebra Seminar, University of Colorado

"The finite lattice representation problem in four parts" — Columbia 2012
University of South Carolina Algebra and Logic Seminar

"Interval sublattice enforceable properties of finite groups" (link to slides) — Columbus 2012
The 31st Ohio State-Denison Mathematics Conference

"Expansions of finite algebras and their congruence lattices" (link to slides) — Honolulu 2012
American Mathematical Society sectional meeting

"Intervals in subgroup lattices and permutation representations of finite groups" — Cullowhee 2012
Western Carolina University Group Theory Seminar

"Recent progress on the finite lattice representation problem" — Honolulu 2011
Achievement Rewards for College Scientists: Scholar Presentations

"The finite lattice representation problem" — Seoul 2009
Joint Meetings of the Korean and American Mathematical Societies

References

Ralph Freese
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University of Hawaii
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* teaching reference