PAUL BAGINSKI

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RESEARCH INTERESTS

Algebra and Number Theory: nonunique factorization in commutative rings and monoids; additive number theory; Dedekind domains and Krull monoids; combinatorial group theory; rings of integer-valued polynomials and other polynomial rings.

Logic and Algebra: stable groups and rings; elementary theory of infinite groups; countably categorical structures.

EDUCATION

Ph.D. in Mathematics, University of California, Berkeley, 2009.
Dissertation: *Stable $\aleph_0$-Categorical Algebraic Structures*
Committee: Thomas Scanlon (chair), Leo Harrington, Christos Papadimitriou

M.S. in Mathematical Sciences, Carnegie Mellon University, 2003. Master's thesis: *The Jet Space Proof of the Mordell-Lang Conjecture in Characteristic Zero*, director: Andrés Villaveces.

B.S. in Mathematical Sciences, Carnegie Mellon University, 2003, University Honors.

POST-GRADUATE EMPLOYMENT

2017–present Associate Professor. Fairfield University.

2013–2017 Assistant Professor. Fairfield University.

2011–2013 Visiting Assistant Professor. Smith College.
McCoy Fellowship (2012–2013)

2009–2011 National Science Foundation International Research Fellow. Université Lyon 1.
Mentor: Tuna Altınel.

PUBLICATIONS

1. "Finding elements with given factorization lengths and multiplicities" (with R. Rodriguez, G. Schaeffer, and Y. She), *Amer. Math. Monthly* **123** (2016), no. 9, 849–870.

2. "Arithmetic congruence monoids: a survey" (with S. Chapman). In **Combinatorial and Additive Number Theory: CANT 2011 and 2012**. Ed. Melvyn Nathanson. Springer Proceedings in Mathematics & Statistics, vol. 101 (2014).

3. "Definable envelopes of nilpotent subgroups of groups with chain conditions on centralizers" (with T. Altınel). *Proc. Amer. Math. Soc.* **142** (2014), no. 5, 1497–1506.

4. "Products of two atoms in Krull monoids and arithmetical characterizations of class groups." (with A. Geroldinger, D. Grynkiewicz, and A. Philipp). *Eur. J. Comb.* **34** (2013), no. 8, 1244–1268.

5. "Factorizations of algebraic integers, block monoids, and additive number theory" (with S. Chapman) *Amer. Math. Monthly* **118** (2011), no. 10, 901–920.

6. "A new characterization of half-factorial Krull monoids" (with R. Kravitz) *J. Algebra Appl.* **9** (2010), no. 5, 825–837.

7. "On the Delta set and catenary degree of Krull monoids with infinite cyclic divisor class group" (with S. Chapman, R. Rodriguez, G. Schaeffer, and Y. She) *J. Pure Appl. Alg.*, **214** (2010), no. 8, 1334–1339.

8. "On the Delta-set of a singular arithmetical congruence monoid," (with S. Chapman and G. Schaeffer) *J. Théor. Nombres Bordeaux* **20** (2008), no. 1, 45–59.

9. "On the asymptotic behavior of unions of sets of lengths in atomic monoids," (with S. Chapman, N. Hine and J. Paixão) *Involve* **1** (2008), no. 1, 101–110.

10. "Elastic properties and prime elements," (with S. Chapman, C. Crutchfield, K. G. Kennedy and M. Wright) *Results Math.* **49** (2006), no. 3-4, 1–14.

11. "Asymptotic elasticity in atomic monoids," (with S. Chapman, M. Holden and T. Moore) *Semigroup Forum* **72** (2006), no. 1, 134–142.

12. "A generalization of a Ramsey-type theorem on hypermatchings," *J. Graph Theory* **50** (2005), no. 2, 142–149.

13. "On cross numbers of minimal zero sequences in certain cyclic groups," (with S. Chapman, K. McDonald and L. Pudwell) *Ars Combin.* **70** (2004), 47–60.

EDITED VOLUMES

1. "**Elementary Theory of Groups and Group Rings, and Related Topics.**" Proceedings of the Conference held at Fairfield University and at the Graduate Center, CUNY, November 1-2, 2018. P. Baginski, B. Fine, A. Moldenhauer, G. Rosenberger, V. Shpilrain, editors. deGruyter. 2020. 272pp.

2. "**Infinite Group Theory: From the Past to the Future.**" B. Fine, A. Gaglione, and P. Baginski, editors. World Scientific Publishing. Feb. 2018. 260pp.

IN PREPARATION

1. "Algebraic properties of semigroup ideals in factorial monoids"

2. "Non-unique factorization of abundant and nondeficient numbers"

3. "Elasticity and catenary degree for integer-valued polynomials" (with G. Knapp, J. Salem, G. Scullard).

4. "Length-set and length-multiplicity completeness in Krull monoids with infinite class group" (with G. Schaeffer).

5. "Stable, countably categorical nonassociative rings"

6. "The plus-minus Davenport constant for $\mathbb{Z}_2^r \oplus \mathbb{Z}_3^s$" (with A. Bekele, K.L. Rosenberg, B. Wright)

7. "Lengths of factorizations in numerical semigroup rings."

8. Book: "**An Introduction to the Theory of Non-Unique Factorizations**" (with S. Chapman).

GRANTS, AWARDS, AND FUNDED RESEARCH

AMS Travel Grant to attend the International Congress of Mathematicians, Rio de Janeiro, Brazil August 2018. $3300.

Fairfield University Science Institute Grant. Supported the visit of a collaborator in May 2018. $1500.

Visiting Researcher, Centre Européen pour les Mathématiques, la Physique et leurs Interactions (CEMPI), Laboratoire d'excellence, Université de Lille 1. June 2017.

George Lang Award, Connecticut State Conference of the AAUP. May 2016.

AMS–NSF Travel Grant to attend the Mathematical Congress of the Americas, Guanajuato, Mexico August 2013. $1800.

French government travel grant to attend Combinatoire Additive à Paris (CAPARIS), Paris, France July 2012. €500.

Project NExT. July 2012 – August 2013.

NSF International Research Fellowship. Université Lyon 1. July 2009–June 2011.
Role: PI. Budget: $136,072. IRFP Grant # 0853293.

Chateaubriand Postdoctoral Fellowship, French Embassy to the United States. Project: The Model Theory of Groups. Host: Université Lyon 1. September 2009–July 2010. (declined to accept NSF International Research Fellowship)

Department of Education Foreign Language and Area Studies (FLAS)
Fellowship to learn French for academic and career advancement. September 2007–May 2008.

Mathematical Logic and Applications (MATHLOGAPS) fellowship at Université Lyon 1, France. May–August 2007.

Department of Homeland Security Fellowship. September 2003–August 2006.

Department of Homeland Security Internship at the Center for Applied Scientific Computing, Lawrence Livermore National Laboratory, Livermore, California. Mentor: Van Henson. Summer 2004.

SUPERVISED RESEARCH AND THESES

Spring 2019 — Undergraduate independent research project. Fairfield University, Connecticut.
Student: Jill Stifano. Project: The Factorization Theory of Abundant Numbers.

Fall 2018 — Master's degree capstone. Fairfield University, Connecticut.
Student: Michael Gold. Project: Ideal Class Groups and the Davenport Constant.

Spring 2018 — Master's degree capstone. Fairfield University, Connecticut.
Student: Jason Howell. Project: Proof of the Prime Number Theorem.

Spring 2018 — Master's degree capstone. Fairfield University, Connecticut.
Student: Jonathan Rosofsky. Project: p-groups, Nilpotence, and Solvability.

Summer 2016 — Project director. NSF Research Experience for Undergraduates (REU)
Fairfield University, Connecticut. REU director: Shawn Rafalski.
Directed 3 undergraduates in commutative algebra research.

Spring 2015 — Master's degree capstone. Fairfield University, Connecticut.
Student: Brett Ford. Project: The p-adic numbers.

Summer 2014 — Project director. NSF Research Experience for Undergraduates (REU)
Fairfield University, Connecticut. REU director: Shawn Rafalski.
Directed 3 undergraduates in additive number theory research.

Fall 2012 — Project director. MTH 301 Topics in Advanced Mathematics: Research
in Mathematics. Smith College, Massachusetts. Course director: Jim Henle.
Directed 4 undergraduate and postbac students in number theory research.

Summer 2012 — Technical Consultant. NSF Research Experience for Undergraduates (REU)
San Diego State University, California. Director: Vadim Ponomarenko.
Devised research projects and provided week of background lectures to students.

Summers of 2008, 2006, 2005 — Graduate Mentor. NSF Research Experience for Undergraduates (REU)
Trinity University, San Antonio, Texas. Director: Scott Chapman.
Students mentored: 2 (2008), 7 (jointly, 2006), 3 (2005).

CONFERENCES ORGANIZED

Elementary Theory of Groups, Group Rings and Related Topics. November 1-2, 2018.
Fairfield University and City University of New York. Co-organized with Ben Fine (Fairfield).

Infinite Group Theory: From the Past to the Future. April 23-24, 2015.
Fairfield University and City University of New York. Co-organized with Ben Fine (Fairfield),
Anthony Gaglione (U.S. Naval Academy), and Vladimir Shpilrain (CUNY).

TEACHING

Fairfield University
2013–present

Master's Level
MATH 6990 Ind. Study: Adv. Group Theory and Galois Theory
MATH 6990 Ind. Study: Analytic Number Theory
MATH 6537 Number Theory
MATH 6535 Advanced Abstract Algebra (Adv. Group Theory and Galois Theory)
MATH 5472 Complex Analysis
MATH 5436 Abstract Algebra (Ring Theory)
MATH 5435 Linear Algebra

Undergraduate Level
MATH 4990 Independent Study (Undergraduate Research)
MATH 4391 Honors Seminar (Cryptography)
MATH 3373 Complex Analysis
MATH 3361 Topics in Algebra (Adv. Group Theory and Galois Theory)
MATH 3337 Number Theory
MATH 3336 Abstract Algebra (Group Theory)
MATH 3301 Topics in Discrete Mathematics (Combinatorics & Graph Theory)
MATH 2235 Linear Algebra
MATH 2231 Discrete Mathematics
MATH 1122 Applied Calculus II (for business, biology, and nursing)
MATH 1121 Applied Calculus I (for business, biology, and nursing)
MATH 1016 Concepts of Calculus (for humanities)
MATH 1101 Precalculus

Smith College
Visiting Asst. Prof.
2011–2013

MTH 400 Independent Study: Algebraic Number Theory
MTH 246 Probability
MTH 238 Topics in Number Theory
MTH 233 Introduction to Modern Algebra
MTH 211 Linear Algebra
MTH 114 Calculus: Differential Equations and Power Series
MTH 112 Calculus II

INVITED TALKS

Talks where the conference or seminar organizers invited me to speak.

Nonunique factorization in the ring of integer-valued polynomials. AMS Spring Central and Western Joint Sectional Meeting, University of Hawaii at Manoa, Honolulu, Hawaii (March 2019)

Nonunique factorization in the ring of integer-valued polynomials. AMS Fall Central Sectional Meeting, University of Michigan, Ann Arbor, Michigan (October 2018)

Model Theory of Groups with Bounded Chains of Centralizers. Logic Seminar, Harvard University, Cambridge, Massachusetts. (April 2018)

Addition Meets Multiplication: The Problem of Nonunique Factorization. Sigma Xi Faculty Research Lecture, Fairfield University, Fairfield, Connecticut. (November 2015)

Davenport Constants, Nonunique Factorization, and Additive Number Theory. Yale University REU, New Haven, Connecticut. (June 2015)

Definability and Nilpotence in Groups with Bounded Chains of Centralizers. Infinite Group Theory: From the Past to the Future, Fairfield University, Fairfield, Connecticut. (April 2015)

Davenport Constants, Nonunique Factorization, and Additive Number Theory. Hamilton College, Clinton, New York. (March 2015)

Finding Elements with Prescribed Factorization Lengths. University at Buffalo, Buffalo, New York. (March 2015)

New Developments for the Plus-Minus Davenport Constant. AMS Special Session on Factorization Theory and Its Applications, AMS/MAA Joint Meetings, San Antonio, Texas. (January 2015)

New Developments for the Plus-Minus Davenport Constant. Arithmetic and Ideal Theory of Rings and Semigroups, Graz, Austria. (September 2014).

Elasticity in Numerical Semigroup Rings and Power Series Rings. International Meeting on Numerical Semigroups, Cortona, Italy. (September 2014)

Stability and Countable Categoricity in Nonassociative Rings. Graduate Center, CUNY, New York City, New York. (March 2014)

Not Overbooking Airline Seats Is Easier When It's Complex. Pi Mu Epsilon Karim Foroud Memorial Lecture. Fairfield University, Fairfield, Connecticut. (March 2014).

Length Multiset-Complete Krull Monoids. AMS Sectional Meeting, Iowa State University, Ames, Iowa. (April 2013)

Full Elasticity in Atomic Monoids. AMS Special Session on Arithmetic and Ideal Theory of Integral Domains and Monoids, AMS/MAA Joint Meetings, San Diego, California. (January 2013)

Stability and Countable Categoricity in Nonassociative Rings. Connecticut Logic Seminar. Wesleyan University, Middletown, Connecticut. (November 2012)

Model Theoretic Advances for Groups With Bounded Chains of Centralizers. Connecticut Logic Seminar. Wesleyan University, Middletown, Connecticut. (January 2012)

Factoring Within Arithmetic Progressions. Plenary Lecture, Undergraduate Research Symposium. University of North Texas, Denton, Texas. (August 2011)

Baer-Suzuki Theorems for Infinite Groups. AMS Special Session on Model Theory of Fields and Applications (Mathematics Research Communities session), AMS/MAA Joint Meetings, New Orleans, Louisiana. (January 2011)

Tautness: Stretched Between Half-Factoriality and Bounded Factorization. Karl-Franzens Universität Graz, Austria. (December 2010)

Factorization in Numerical Semigroup Rings. University of Stockholm, Stockholm, Sweden. (September 2010)

Factorization in Semigroup Rings. Second Annual Iberian Meeting on Numerical Semigroups, Granada, Spain. (February 2010)

Equivalence Relations and Factorization. Karl-Franzens Universität Graz, Graz, Austria. (November 2009)

Stable $\aleph_0$-categorical Algebraic Structures. Special Session on Model Theory and Its Applications, AMS Meeting Fall Eastern Section, Wesleyan University, Middletown, CT. (October 2008)

Stable $\aleph_0$-categorical Algebraic Structures. McMaster University, Hamilton, Canada. (October 2007)

A Case Study in Factorization Theory: Arithmetic Congruence Monoids. The Art of Factorization in Multiplicative Structures (MAA PREP Workshop), Trinity University, San Antonio, TX. (May 2007)

Monoids and Combinatorics I, II, and III. The Art of Factorization in Multiplicative Structures (MAA PREP Workshop), Trinity University, San Antonio, TX. (May 2007)

Elasticity in Polynomial Rings and Block Monoids. Karl-Franzens Universität Graz, Austria. (December 2006)

Stable $\aleph_0$-Categorical Rings. Université Denis Diderot - Paris VII, France. (November 2006)

Centralizers and Connectedness in Group Theory. Trinity University, San Antonio, TX. (March 2006)

Elasticity in Polynomial and Power Series Rings. Special Session on Commutative Rings and Monoids, AMS/MAA Joint Meetings, San Antonio, TX (January 2006)

Uniwersalne Grafy z Zabronionymi Podgrafami (Universal Graphs with Forbidden Subgraphs). University of Wrocław, Poland. (March 2005)

Ax's Theorem. Trinity University, San Antonio, TX. (June 2004)

CONFERENCE TALKS

Talks where I submitted an abstract, which was accepted after review.

Abundant Numbers and Nonunique Factorization. Joint Mathematics Meetings, Denver, CO. (January 2020)

Abundant Numbers and Nonunique Factorization. Combinatorial and Additive Number Theory (CANT), City University of New York, New York City, NY. (May 2019)

Nonunique Factorization in the Ring of Integer-Valued Polynomials. Combinatorial and Additive Number Theory (CANT), City University of New York, New York City, NY. (May 2018)

Nonunique Factorization in the Ring of Integer-Valued Polynomials. Conference on Rings and Factorizations, Karl-Franzens Universität Graz, Graz, Austria. (February 2018)

Elasticity and Factorization in Numerical Semigroup Rings. Meeting of the Swedish, Spanish and Catalan Mathematical Societies, Umeå, Sweden. (June 2017)

Nonunique Factorization in the Ring of Integer-Valued Polynomials. Joint Mathematics Meetings, Atlanta, GA. (January 2017)

Model Theoretic Advances for Groups with Bounded Chains of Centralizers. Zassenhaus Group Theory Conference, Adelphi University, Garden City, NY. (June 2016)

Arithmetic Progressions, Nonunique Factorization, and Additive Combinatorics in the Group of Units Mod n. Combinatorial and Additive Number Theory (CANT), City University of New York, New York City, NY. (May 2016)

Elasticity in Arithmetic Congruence Monoids. AMS/MAA Joint Meetings, Seattle, WA. (January 2016)

Elasticity in Arithmetic Congruence Monoids. Combinatorial and Additive Number Theory, Karl-Franzens Universität Graz, Graz, Austria. (January 2016)

Finding Elements with Prescribed Factorization Lengths. Combinatorial and Additive Number Theory (CANT), City University of New York, New York City, NY. (May 2015)

Model Theoretic Advances for Groups With Bounded Chains of Centralizers. Ischia Group Theory 2014, Ischia, Italy. (April 2014)

Length Multiset-Complete Krull Monoids. AMS/MAA Joint Meetings, Baltimore, MD. (January 2014)

Stability and Countable Categoricity in Nonassociative Rings. Models and Groups, Boğaziçi University, Istanbul, Turkey. (September 2013)

Length Multiset-Complete Krull Monoids. Journées estivales de la Méthode Polynomiale, Université Lille 1, Lille, France. (June 2013)

Length Multiset-Complete Krull Monoids. Combinatorial and Additive Number Theory (CANT), City University of New York, New York City, NY. (May 2013)

Stable $\aleph_0$-Categorical Nonassociative Rings. AMS/MAA Joint Meetings, San Diego, CA. (January 2013)

Model Theory and Nilpotence in Groups with Bounded Chains of Centralizers. Antalya Algebra Days XIV, Çeşme, Turkey. (May 2012)

Nilpotence in Groups with Bounded Chains of Centralizers. AMS/MAA Joint Meetings, Boston, MA. (January 2012)

Factoring Within Arithmetic Progressions. Combinatorial and Additive Number Theory (CANT), City University of New York, New York City, NY. (May 2011)

Baer-Suzuki Theorems for Infinite Groups. British Postgraduate Model Theory Conference, Leeds, England. (January 2011)

Factorization Techniques for Numerical Semigroup Rings. AMS Session on Commutative Rings and Fields, AMS/MAA Joint Meetings, New Orleans, LA. (January 2011)

Lengths of Factorizations in Numerical Semigroup Rings. Third International Meeting on Integer Valued Polynomials and Problems in Commutative Algebra, CIRM, Luminy, France. (November 2010)

Elimination of Imaginaries for the p-adics. Model Theory of Fields, AMS Mathematics Research Community, Snowbird, UT. (June 2010)

Factorization in Numerical Semigroup Rings. Combinatorial and Additive Number Theory (CANT), City University of New York, New York City, NY. (May 2010)

Model Theory of Stable Groups. AMS Session on Algebras, AMS/MAA Joint Meetings, San Francisco, CA. (January 2010)

Stable, $\aleph_0$-Categorical Algebraic Structures. Fourth MATHLOGAPS training workshop, University of Manchester, England. (July 2008)

Explicit Computation of the Modular Equation. Undergraduate Mathematics Day, University of Dayton, OH (November 2003)

UNIVERSITY AND PROFESSIONAL SERVICE

Faculty Salary Committee, Fairfield University.
Chair: 2018–20. *Member:* Fall 2015; Spring 2017–August 2020.
Negotiation with Administration of the terms of the general faculty contract and benefits.

Health Care Committee, Fairfield University. Fall 2017–Spring 2020.
Joint Faculty and Administration committee to investigate cost-saving measures to employee healthcare plans.

Budget Committee, Fairfield University. Fall 2018–Spring 2020.
Joint Faculty and Administration committee to plan the long-term budget for the university.

Faculty Welfare Committee / AAUP Fairfield University Chapter.
Treasurer: Fall 2016–present.
Membership director: Fall 2015–Spring 2017.
Local chapter of the AAUP. Representing the rights of faculty and fostering faculty unity.

Search Committee, College of Engineering, Fairfield University. 2015–16.
TT hire in mechanical engineering. External member. Reviewed applications and interviewed candidates.

Admissions and Scholarships Committee, Fairfield University. Spring 2015–Spring 2017.
Chair: 2016–17. Member: Spring 2015–Spring 2017.
Works with administration regarding issues of student recruitment, enrollment, and financial aid.

Library Committee, Fairfield University. Spring 2014.

Science Center Committee on Diversity, Smith College, 2011–2013.
Mentoring for students of color in STEM fields.

DEPARTMENTAL SERVICE

Coordinator of Adjunct Faculty, Fairfield University. 2018–2020.
Hiring, onboarding, performance review, and administration of adjunct faculty in math.

Graduate Program Steering Committee, Fairfield University. 2018–present.
Graduate student admissions, course offerings, and program development.

Search Committee, Mathematics, Fairfield University, 2019–20.
2 TT hires in math. Reviewed applications and interviewed candidates.

Search Committee, Mathematics, Fairfield University. Spring 2019.
5 VAP hires in math. Reviewed applications.

Search Committee, Mathematics, Fairfield University. 2018–19.
TT hire in statistics. Reviewed applications and interviewed candidates.

Search Committee, Mathematics, Fairfield University. 2016–17.
TT hire in math education. Reviewed applications and interviewed candidates.

Colloquium Organizer, Mathematics, Fairfield University. 2019Ð2020.

Course coordinator for

- MA 231 Discrete Mathematics. Fall 2017.

- MA 119-120-221 Applied Calculus I, II, III. Fall 2015 (joint), Spring 2016 (joint).
- MA 16 Concepts of Calculus. Fall 2017.
- MA 11 Precalculus. Fall 2018.

Textbook review committee for MA 119-120-221 Applied Calculus I, II, III and MA 145-146-245 Calculus I, II, III for Chemistry, Engineering, and Physics. Spring 2015.

Comprehensive Exam, Fairfield University. Januaries, 2014–present. Wrote and graded questions for the comprehensive exam which all mathematics majors are required to pass.

Graduate School Panel, Fairfield University. November 2013.
Informational panel for junior and senior mathematics majors about applying for graduate school.

Women of Distinction, Smith College. November 2011 and 2012.
Organized an activity booth for the Mathematics and Statistics Department during an open house of STEM majors for prospective female students of color.

Presentation of the logic major and minor, Smith College, Fall 2012. Discussion and reception for students interested in studying logic.

REFEREEING & REVIEWING

Refereed papers for:

- *American Mathematical Monthly* (2010, 2011, 2012 x2, 2013, 2016 x2, 2017 x2, 2018, 2019, 2020)
- *Annals of Pure and Applied Logic* (2012)
- *Arabian Journal for Science and Engineering* (2010)
- *Archive for Mathematical Logic* (2016)
- *Czechoslovak Mathematical Journal* (2011 x2)
- *Discrete Mathematics* (2006 x2)
- *Graphs and Combinatorics* (2008)
- *Integers* (2013, 2016, 2020)
- *Involve* (2009, 2013)
- *Journal of Algebra* (2014)
- *Journal of Commutative Algebra* (2019)
- *Journal of Number Theory* (2007)
- *Journal of Number Theory Bordeaux* (2010)
- *Monatshefte für Mathematik* (2015)
- *Results in Mathematics* (2013)
- *Semigroup Forum* (2011)
- *Transactions of the AMS* (2013)

Reviewed papers for

- *Zentralblatt MATH* (2008)

PROFESSIONAL AFFILIATIONS

American Association of University Professors; American Mathematical Society;
Association for Symbolic Logic; Mathematical Association of America; Pi Mu Epsilon

OTHER

Languages: Native Speaker in English and Polish. Proficient in French. Intermediate in German. Beginner in Spanish.

Computer Skills: Java, Javascript, Mathematica

Citizenship: USA