Alexei Kolesnikov

Department of Mathematics
8000 York Rd.
Towson University
Towson, MD, 21252

Phone: (410) 704-3504
Fax: (410) 704-4149
Email: akolesnikov@towson.edu
Web: tigerweb.towson.edu/akolesni

Employment

January 2020 – present: Director of Undergraduate Research; Towson University

August 2018 – present: Professor; Towson University

August 2013 – July 2018: Associate Professor; Towson University

August 2013 – June 2014: Shelly Visiting Associate Professor; Carnegie Mellon University

August 2007 – July 2013: Tenure-track Assistant Professor; Towson University

September 2004 – August 2007: Postdoctoral Assistant Professor; University of Michigan

Education

Ph.D. in Mathematics, May 2004. Carnegie Mellon University; Pittsburgh, PA
Thesis: "Generalized amalgamation in simple theories and characterization of dependence relations in non-elementary classes." Advisor: Professor Rami Grossberg

Research

Refereed publications

1. Applied Mathematics Laboratory: A Course-Based Research Internship. With M. Gluck. *The Mathematics Enthusiast*, (2022), Article 9.
2. The relativized Lascar groups, type-amalgamation, and algebraicity. With J. Dobrowolski, B. Kim, and J. Lee. *Journal of Symbolic Logic*, (2021), 531–557.
3. Comparing Placement Policies at a Four-Year Institution. With K. Frank and X. Wang. *PRIMUS*, (2021), 1–16.
4. Imagine no remediation: Evaluation of a placement policy change. With X. Wang and undergraduate students M. Bonaduce, M. Cunningham, L. Fontinell, T. Halliwell, and M. Twillman. *Research in Higher Education*, (2019), 1–22.
5. Homology of types in stable theories and the Hurewitz correspondence. With J. Goodrick and B. Kim. *Annals of Pure and Applied Logic*, **168**, (2017), 1710–1728.
6. Interpolation properties of C^1 quadratic splines on hexagonal cells. With undergraduate students L. Allen, K. Borst, B. Claiborne, K. Pilewski. *Computer Aided Geometric Design*, **45**, (2016), 73–82.
7. Canonical forking in AECs. With W. Boney, R. Grossberg, S. Vasey. *Annals of Pure and Applied Logic*, **167**, (2016), 590–613.
8. The Hanf number for amalgamation of coloring classes. With C. Lambie-Hanson. *Journal of Symbolic Logic*, **81**, (2016), 570–583.

9. Type-amalgamation properties and polygroupoids in stable theories. With J. Goodrick and B. Kim. *Journal of Mathematical Logic*, **15**, (2015), 45pp.
10. Characterization of the second homology group of a stationary type in a stable theory. With J. Goodrick and B. Kim. *Proceedings of Asian Logic Colloquium, 2013*, World Scientific, (2015), 93–104.
11. Multivariate C^1-continuous splines on the Alfeld split of a simplex. With T. Sorokina. Proceedings of Approximation Theory XIV: San Antonio 2013. *Springer Proceedings in Mathematics & Statistics* **83**, (2014), 283–294.
12. Homology groups of types in model theory and the computation of $H_2(p)$. With J. Goodrick and B. Kim. *Journal of Symbolic Logic*, **78**, (2013), 1086–1114.
13. Estimation of the commodity flow of chlorine from storage data. With A. Kumchev and undergraduate students D. Howell, P. O'Neill, and M. Tiger. *Journal of Transportation Security*, **5**, (2012), 51–68.
14. Amalgamation functors and boundary properties in simple theories. With J. Goodrick and B. Kim. *Israel Journal of Mathematics*, **193**, (2013), 169–207.
15. Groupoids, covers, and 3-uniqueness in stable theories. With J. Goodrick. *Journal of Symbolic Logic*, **75**, (2010), 905–929.
16. The amalgamation spectrum. With J. Baldwin and S. Shelah. *Journal of Symbolic Logic*, **74**, (2009), 914–928.
17. Generalized amalgamation and n-simplicity. With B. Kim and A. Tsuboi. *Annals of Pure and Applied Logic*, **155**, (2008), 97–114.
18. Categoricity, amalgamation, and tameness. With J. Baldwin. *Israel Journal of Mathematics*, **170**, (2009), 411–443.
19. Morley rank in homogeneous models. With G.V.N.G. Krishnamurthi. *Notre Dame Journal of Formal Logic*, **46**, (2006), 319–329.
20. n-simple theories. *Annals of Pure and Applied Logic*, **131**, (2005), 227–261.
21. Dependence relations in non-elementary classes. *Contemp. Math., AMS*, **380**, (2005), 203–230.
22. The equality $S1 = D = R$. With R. Grossberg, I. Tomasic, and M. VanDieren. *Mathematical Logic Quarterly*, **49**, (2003), 115–128.

Other publications

1. Amalgamation functors and homology groups in model theory. With J. Goodrick and B. Kim. Proceedings of the 2014 International Congress of Mathematicians, **2**, (2014), 41–58.
2. Risk Analysis: Toxic Materials Transportation Security. White paper joint with A. Kumchev, D. Howell, P. O'Neill, and M. Tiger. *Journal of Homeland Security*.
3. Bridging Theater and Mathematics: a Mathematician's View. A refereed proceedings paper for Bridges 2011 conference.

Recent Presentations

- August 2021. Online talk: "Braille version of mathematics textbooks." TEX Users Group Conference.
- January 2020. Special session talk: "Automated transcription of a mathematics textbook into Nemeth Braille." Joint Mathematics Meetings, Denver, CO.

- October 2018. Seminar talk: "Elimination of generalized imaginaries in some stable theories." University of Maryland Logic Seminar.
- April 2018. Seminar talk: "Homology groups in model theory." University of Michigan Logic Seminar.
- November 2017. Seminar talk: "Relativized Lascar groups." University of Maryland Logic Seminar.
- November 2017. Sabbatical talk: "Homology groups in model theory." Towson University Mathematics Colloquium.
- April 2017. Seminar talk: "Amalgamation of systems of types indexed by posets in simple theories." Yonsei University Logic Seminar.
- April 2017. Seminar talk: "Homology groups for types in stable theories." Rutgers University Logic Seminar.
- November 2016. Seminar talk: "n-simple theories." University of Maryland Logic Seminar.
- October 2016. Conference talk: "Polygroupoids and homology groups: the search for natural examples." Northeast Regional Model Theory Day, University of Pennsylvania.
- June 2016. Invited conference talk: "Hurewitz correspondence revisited." International Model Theory Conference, University of Notre Dame.
- October 2015. Seminar talk: "The Hanf number for amalgamation." CUNY Logic Workshop.
- April 2015. Workshop presentation: "Interpolation properties of C^1 quadratic splines on hexagonal cells." Oberwolfach conference on Multivariate splines and algebraic geometry; Oberwolfach, Germany.
- March 2015. Seminar talk: "Homology groups in model theory." University of Pennsylvania Logic Seminar.
- January 2015. Invited talk: "Homology groups in model theory". Asian Logic Colloquium, IIT-Bombay, Mumbai, India.

Awards and Fellowships

- 2020 NSF S-STEM grant "Recruiting, Educating, and Graduating a Diverse Community of Mathematicians Through Mentoring, Peer Support, and Undergraduate Research" (co-PI with Drs. O'Leary and Lauderdale).
- 2020 Grant from the American Action Fund for Blind Children and Adults. "Automated Translation of Mathematics Textbooks into Braille."
- 2019 Excellence in Mentoring Award, Fisher College of Science and Mathematics
- 2019 Grant from the American Action Fund for Blind Children and Adults. "Automated production of Braille mathematics books."
- 2019 Towson University "Baltimore–TU Partnership award" for Applied Mathematics Laboratory work
- 2017–2018 Development grant from PNC Bank to work on the project for the Baltimore Humane Society
- 2016 Excellence in Teaching Award, Fisher College of Science and Mathematics

- 2015 Grant from RTR Technologies. "Automated baselining."
- 2011, 2012, 2013, and 2014 Grants from MAA to conduct the Undergraduate Mathematics Research Conference at Towson University
- 2010–2011 Grant from Chemical Security Analysis Center. "Risk Analysis: Toxic Materials Transportation Security"
- 2009–2012 NSF grant award DMS-0901315 "Research in Model Theory: Generalized Amalgamation Properties"

Professional Service

- Member of the Program Committee for the 2019 Winter Association for Symbolic Logic Meeting in Baltimore
- Organizer for the Undergraduate Mathematics Research Conference at Towson University
- Reviewer for the NSF grant proposals
- Member of the Organizing Committee and Program Committee for the 2010 Annual Association for Symbolic Logic Meeting
- Book reviewer for AMS University Lecture Series
- Referee for Annals of Pure and Applied Logic, Archives of Mathematical Logic, Journal of Symbolic Logic, Notre Dame Journal of Formal Logic, Transactions of the AMS, Journal of Theoretical Computer Science
- Instructor for the Michigan Math and Science Scholar program
- Member of Ph.D. dissertation committee for Bart Kastermans, University of Michigan

Teaching Experience

Undergraduate research projects

- REU student group on Machine Learning and Model Theory, spring 2021, continued in 2021–2022, co-directed with Dr. V. Guingona. Results were presented by the students Julie Nierwinski, Avery Schweitzer, Richard Soucy, Ramón Surís-Rodríguez at Towson undergraduate conference, Math Fest, and Naval Academy Conference.
- Student Activity Group in Data Science, summer 2018, continued in 2018–2019, co-directed with Dr. C. Cornwell. Results were presented by the students Ashley Imus, Derek Margulies, and Jennifer Weiler at Towson undergraduate conference. Jennifer Weiler was recognized with the *Outstanding Poster Presentation Award* by the MAA at the Joint Meetings in Baltimore.
- Kristian Brown. "Basketball data analytics." Louis Stokes Alliance for Minority Participation (LSAMP) project during the summer 2018. Presented during the LSAMP conference in College Park and at the Joint Meetings in Baltimore.
- Applied Mathematics Laboratory project "Donation record analysis for Baltimore Humane Society." Presented to the sponsoring organization in spring and fall 2018; at Towson undergraduate student conference in 2018 and 2019, and at Joint Mathematics Meetings in 2019.
- Student Activity Group in Education Policy Data Analysis, summer 2017, co-directed with Dr. X. Wang. Joint paper with the students is referenced in the refereed publication list.

- Applied Mathematics Laboratory project "Automated baselining." Presented to the sponsoring organization in 2015–2016.
- Andrew Francis. "Comparing the bounds on dimensions of trivariate spline spaces." Presented at undergraduate student conferences at Kennesaw State and Towson University in 2014–2015.
- Devan DiMatteo. "Dimension of trivariate C^1 splines on double pyramid cells." Presented at undergraduate student conferences at Kennesaw State and Towson University in 2014–2015.
- Zeba Ahmed. "Exact geometry and dimension of bivariate splines." Presented at undergraduate student conference at Towson University in 2015.
- Larry Allen. "Characterization of Unconfinable Hexagonal Cells." Presented at undergraduate student conferences at Kennesaw State and Towson University in 2014–2015.
- Rachael Maddy. "Multiplication of Bernstein–Bézier polynomials." Presented at the Joint Mathematics Meetings in Baltimore in 2014.
- James Hughes. "Application of Akima's method and cubic splines." Presented at the Joint Mathematics Meetings in Baltimore in 2014.
- Larry Allen. "Dimension of the spaces of smooth bivariate splines on hexagonal partitions." Presented at undergraduate student conferences at Kennesaw State and Towson University in 2013–2014 and at the Joint Mathematics Meetings in Baltimore in 2014.
- Matthew Green. "A factorial power version of Fermat's equation." Published in Rose-Hulman Undergraduate Mathematics Journal, **13**, (2012), 44–51.
- Kimberly Rausch. "Mathematics of anamorphic art." Presented at Bridges Conference 2012; paper published in peer-reviewed conference proceedings.
- Benjamin Vogel. "The sum of two squares." Presented at Undergraduate Mathematics Research Conference at Towson, 2012.
- Applied Mathematics Laboratory project "Risk Analysis: Toxic Materials Transportation Security." Joint paper with the students is referenced in the refereed publication list.

Courses Taught

- Mathematical concepts and structures II (a content course for elementary school teachers)
- Pre-Calculus, Calculus for applications, Calculus-1, Calculus-2, Calculus-3
- Differential equations
- Linear algebra, Introduction to abstract mathematics
- Introduction to cryptography
- Applied combinatorics
- Introduction to abstract algebra
- Mathematical models
- Operations research
- Applied Mathematics Laboratory
- Senior seminar (a capstone course)