

Alexandra Seceleanu

Curriculum Vitae

203 Avery Hall

Lincoln, NE 68588

☎ (402) 472-7253

✉ aseceleanu@unl.edu

🌐 www.math.unl.edu/~aseceleanu2

Research interests

Commutative algebra and algebraic geometry, with emphasis on computational algebra, homological methods and their connections to algebraic geometry.

Education

- 2005–2011 **PhD in Mathematics**, *University of Illinois*, Urbana–Champaign.
Thesis: “*The Syzygy Theorem and the Weak Lefschetz property*”
- 2003–2005 **Master of Science**, *Școala Normală Superioară București (SNSB)*, Romania.
Concentration in Algebra–Geometry–Topology
- 2000–2005 **Bachelor of Science**, *University of Bucharest*, Romania.
Majors: Mathematics and Computer Science

Academic Appointments

- 2015–present **Assistant Professor**, *University of Nebraska–Lincoln*, Lincoln, Nebraska.
- 2012–2015 **Edith T. Hitz Research Assistant Professor**, (*postdoctoral position*) *University of Nebraska–Lincoln*, Lincoln, Nebraska.
- Aug–Dec 2012 **Postdoctoral Research Member**, *The Mathematical Sciences Research Institute (MSRI)*, Berkeley, California.
- 2011–2012 **Postdoctoral Research Fellow**, *University of Nebraska–Lincoln*, Lincoln, Nebraska.

Grants

- 2018–2019 **Epscor First Award** OIA-1557417 granted by Nebraska Epscor.
- 2018–2020 **NSF Conference Grant** DMS-1811000 (with co-PI's from UNL and Kansas State).
Central States Mathematics Undergraduate Research Conference.
- 2016–2019 **NSF Investigator Grant** DMS-1601024.
Symbolic powers, configurations of linear spaces and applications.
- Feb 2015 **NSF US Junior Oberwolfach Fellowship** to support workshop participation.
- 2013–2014 **NSF–AWM Mentoring Travel Grant** to visit University of Kentucky.

Honors and Awards

- 2018–2020 **Harold and Esther Edgerton Junior Faculty Award** conferred by UNL for creative research, extraordinary teaching abilities, and academic promise.
- 2018 **Roger Wiegand Award** for contributions to the UNL mathematics graduate program.
- 2011 **Irving Reiner Memorial Award** for outstanding scholastic achievement in algebra.
- 2010 **Mathematics Department Fellowship**, University of Illinois at Urbana-Champaign.
- 2005–2008 **Illinois Distinguished Fellowship**, University of Illinois at Urbana-Champaign.

Publications appeared or accepted

- 2018
- 1 *Negative curves on symmetric blowups of the projective plane, resurgences and Waldschmidt constants* (with Th. Bauer, S. Di Rocco, B. Harbourne, J. Huizenga, T. Szemberg), *Int. Math. Res. Not.* rnx329, published online February 2018
 - 2 *Calculations involving symbolic powers* (with E. Grifo, B. Drabkin, B. Stone), *JSAG* (Journal of Software for Algebra and Geometry), 2018.
 - 3 *Determinants of incidence and Hessian matrices arising from the vector space lattice* (with S. Nasseh and J. Watanabe), *J. Commutative Algebra*, published online September 2016, to appear in 2018.
 - 4 *A tight bound on the projective dimension of four quadrics* (with C. Huneke, J. McCullough and P. Mantero), *J. Pure Appl. Algebra* 222 (2018), no. 9, 2524–2551.
- 2016
- 5 *The Waldschmidt constant for squarefree monomial ideals* (with C. Bocci, S. Cooper, E. Guardo, B. Harbourne, M. Janssen, U Nagel, A. Van Tuyl, T. Vu), *J. Algebraic Combin.* 44 (2016), no. 4, 875–904.
 - 6 *Ordinary and symbolic Rees algebras of Fermat point configurations* (with U. Nagel), *J. Algebra* 468 (2016), 80–102.
 - 7 *Multiple structures with arbitrarily large projective dimension on linear subspaces* (with C. Huneke, J. McCullough and P. Mantero), *J. Algebra* 447 (2016), 183–205.
- 2015
- 8 *Resurgences for ideals of special point configurations in \mathbb{P}^N coming from hyperplane arrangements* (with M. Dumnicki, B. Harbourne, U. Nagel, T. Szemberg, H. Tutaj-Gasinska), *J. Algebra* 443 (2015), 383–394.
 - 9 *A homological criterion for the failure of containment between symbolic and ordinary powers of ideals of points in \mathbb{P}^2* , *J. Pure Appl. Algebra* 219 (2015), no. 11, 4857–4871.
 - 10 *A multiplicity bound for graded rings and a criterion for the Cohen-Macaulay property* (with C. Huneke, J. McCullough and P. Mantero), *Proc. Amer. Math. Soc.* 143 (2015), no. 6, 2365–2377.
 - 11 *Containment counterexamples for ideals of various configurations of points in \mathbb{P}^N* (with B. Harbourne), *J. Pure Appl. Algebra* 219 (2015), 1062–1072.
- 2014
- 12 *Syzygies and singularities of tensor product surfaces of bidegree $(2, 1)$* (with H. Schenck and J. Validashti), *Math. Comp.* 83 (2014), 1337–1372.
- 2013
- 13 *The projective dimension of codimension two algebras presented by quadrics* (with C. Huneke, J. McCullough and P. Mantero), *J. Algebra* 393 (2013), 170–186.
 - 14 *Bounding projective dimension* (with J. McCullough) - book chapter in *Commutative Algebra, Expository Papers Dedicated to David Eisenbud on the Occasion of His 65th Birthday*, Springer-Verlag London Ltd., London, 2013.
- 2012
- 15 *Syzygy theorems via comparison of order ideals on a hypersurface* (with P.A. Griffith), *J. Pure Appl. Algebra* 216 (2012), 468–479.
- 2011
- 16 *Inverse systems, Gelfand-Tsetlin patterns and the weak Lefschetz property* (with B. Harbourne and H. Schenck) *J. London Math. Soc.*, 84 (2011), 712–730.
 - 17 *Ideals with large projective dimension and regularity* (with J. Beder, J. McCullough, L. Nunez-Betancourt, B. Snapp, B. Stone), *J. Symb. Comput.* 46 (2011), 1105–1113.
- 2010
- 18 *The Weak Lefschetz Property and powers of linear forms in $K[x, y, z]$* (with H. Schenck), *Proc. Amer. Math. Soc.* 138 (2010), 2335–2339.

Publications under review

- 19 *Computations in intersection rings of flag bundles* (with D. Grayson and M. Stillman).
- 20 *Symbolic powers of codimension two Cohen-Macaulay ideals* (with S. Cooper, G. Fattabbi, E. Guardo, A. Lorenzini, J. Migliore, U. Nagel, J. Szpond, A. Van Tuyl).
- 21 *Frieze varieties: A characterization of the finite-tame-wild trichotomy for acyclic quivers* (with K. Lee, L. Li, M. Mills and R. Schiffler)

Manuscripts in preparation

- 21 *Polynomial growth of Betti sequences over local rings* (with L. Avramov and Z. Yang)
- 22 *On Sally semigroup rings* (with D. Stamate)
- 23 *Betti numbers for symbolic powers of star configuration ideals* (with J. Biermann, H. De Alba Casillas, F. Galetto, S. Murai, U. Nagel, T. Römer, A. O’Keefe)
- 24 *Macaulay dual elements and strong Lefschetz properties of connected sums of artinian Gorenstein algebras* (with C. McDaniel, A. Iarrobino)

Conference Presentations

- 12/2018 Canadian Math Society winter meeting, Vancouver, BC, Canada.
- *Special Session on Symbolic and Regular Powers of Ideals*
- 11/2018 Geometric Methods in Representation Theory, Iowa City, IA.
- 10/2018 MFO – Asymptotic Invariants of Homogeneous Ideals, Oberwolfach, Germany.
- 06/2018 BIRS workshop – New Trends in Syzygies, Banff, Canada.
- 04/2018 Commutative Algebra workshop, Charlottesville, VA.
- 03/2018 AMS Sectional Meeting, Columbus, OH.
- *Special Session on Lefschetz Properties*
- 12/2017 Cluster algebra workshop, Lincoln, NE.
- 10/2017 Structures on Free Resolutions, Lubbock, TX.
- 09/2017 AMS Sectional Meeting, Denton, TX.
- *Special Session on Commutative Algebra*
- 08/2017 SIAM Conference on Applied Algebraic Geometry, Atlanta, GA.
- *Minisymposium on Free Resolutions Governed by Geometric and/or Combinatorial Data*
- 07/2017 Stillman’s Conjecture and Other Progress on Free Resolutions, Berkeley, CA.
- 06/2017 Commutative Algebra Meeting Algebraic Geometry, Bucharest, Romania.
- 05/2017 CMO – Symbolic and Ordinary Powers of Ideals, Oaxaca, Mexico.
- 08/2016 CMO – Geometric Modeling and Approximation Theory, Oaxaca, Mexico.
- 07/2016 Commutative Algebra and its Interactions with Algebraic Geometry: Tight Closure, Linkage, and Syzygies, Ann Arbor, MI.
- 04/2016 AMS Sectional Meeting, Fargo, ND.
- *Commutative Algebra & Interactions with Combinatorics and Algebraic Geometry*
- 04/2016 AMS Sectional Meeting, Salt Lake City, UT.
- *Combinatorial and Computational Commutative Algebra and Algebraic Geometry*
- 03/2016 AMS Sectional Meeting, Athens, GA.
- *Session on Commutative Algebra*
- *Session on Combinatorial and Computational Algebra*

- 02/2016 MFO – Arrangements of subvarieties & their applications in algebraic geometry, Oberwolfach, Germany.
- 10/2015 KUMUNU, *University of Missouri*, Columbia, MO.
- 07/2015 Eighth International Congress of Romanian Mathematicians, Iași, Romania.
- 07/2015 Minimal free resolutions, Betti numbers, and combinatorics, Edinburgh, Scotland.
- 03/2015 Algebra Day, *University of Kansas*, Lawrence, KS.
- 02/2015 MFO–Linear systems, symbolic powers and Waring problems, Oberwolfach, Germany.
- 01/2015 AMS-MAA Joint Mathematics Meeting, San Antonio, TX.
- *Special session on Syzygies*
- 09/2014 AMS Sectional Meeting, Eau-Claire, WI.
- *Special Session on New Developments in Toric Varieties*
- 01/2014 AMS-MAA Joint Mathematics Meeting, Baltimore, MD.
- *Special Session on Homological and Characteristic p Methods*
- 10/2013 AMS Sectional Meeting, Louisville, KY.
- *Special Session on Combinatorial Commutative Algebra*
- 10/2013 AMS Sectional Meeting, Louisville, KY.
- *Special Session on Recent Advances in Commutative Algebra and its Applications*
- 09/2013 Interactions between Commutative Algebra and Algebraic Geometry II.
Tulane University, New Orleans, LA
- 08/2013 SIAM Conference on Applied Algebraic Geometry, Fort Collins, CO.
- *Minisymposium on Approximation Theory, Geometric Modeling, and Algebraic Geometry*
- *Minisymposium on Computations and Effective Bounds in Commutative Algebra*
- 06/2013 AMS - RMS Joint International Meeting, Alba-Iulia, Romania.
- 11/2012 Workshop on Syzygies, *Cornell University*, Ithaca, NY.
- 09/2012 Focus Period Members' Seminar, *MSRI*, Berkeley.
- 04/2012 Algebra, Geometry and Combinatorics Day, *UIUC*, Champaign, IL.
- 03/2012 AMS Sectional Meeting, Lawrence, KS.
- *Special session on Singularities in Commutative Algebra and Algebraic Geometry*
- 10/2011 AMS Sectional Meeting, Lincoln, NE.
- *Special session on Algebraic Geometry and Graded Commutative Algebra*
- 07/2011 Seventh International Congress of Romanian Mathematicians, Brașov, Romania.
- 05/2011 Resolutions Day, *Cornell University*, Ithaca, NY.
- 01/2011 AMS-MAA Joint Mathematics Meeting, New Orleans, LA .
- *Special session on Commutative Algebra (Mathematics Research Communities)*
- 01/2010 AMS-MAA Joint Mathematics Meeting, San Francisco, CA.
- *Special session on Commutative Algebra*
- 11/2009 AMS Sectional Meeting, Boca Raton, FL.
- *Special session on Graded Resolutions*

Colloquia

- 02/2015 University of Nebraska, Clemson University, DePaul University, University of Vermont
- 01/2015 Iowa State University, New Mexico State University, University of South Carolina
- 10/2014 Syracuse University
- 09/2011 University of Nebraska–Lincoln

Conference Organization

- 2019 Co-organizer for a special session on *Recent Advances in Homological and Commutative Algebra* at the Joint Mathematics Meetings, Baltimore, MD.
- 2018 Co-organizer for a focused research group on *Investigating Linear Codes via Commutative Algebra* at the Banff Interantional Research Station.
- 2017 Co-organizer for a special session on *Commutative Algebra* in the framework of the AWM Research Symposium at UCLA.
- 2014 Co-organizer for a special session on *Commutative Algebra and Algebraic Geometry* at the AMS Sectional Meeting at Texas Tech University.

Teaching Experience

All course listed below were taught as *instructor of record* with full course responsibilities.

At the University of Nebraska-Lincoln:

MATH 189H The Joy of Numbers (honors curriculum course)	Fall 2014
MATH 208 Analytic Geometry and Calculus III	Spring 2013
MATH 310 Introduction to Modern Algebra	4 times
MATH 314/814 Linear Algebra	3 times
MATH 314H Honors Applied Linear Algebra (honors curriculum course)	Spring 2017
MATH 325 Introduction to Real Analysis	Fall 2017
MATH 407 Mathematics for High School Teaching I	Spring 2018
MATH 417 Group Theory	Spring 2013
MATH 435 Math in the City ²	Fall 2013
MATH 805T Discrete Mathematics for Teachers	Summer 2016
MATH 817 Introduction to Modern Algebra I (graduate course)	Fall 2018
MATH 818 Introduction to Modern Algebra II (graduate course)	Spring 2017, 2019
<i>Co-instructor</i> for MATH 896 Mathematics Literature Seminar (graduate course)	Summer 2014
MATH 905 Commutative Algebra (graduate course)	Fall 2017
MATH 918 Computational Algebra (graduate topics course)	Fall 2013
MATH 918 Geometry of Syzygies (graduate topics course)	Spring 2016

At the University of Illinois at Urbana-Champaign:

MATH 231 Calculus II, <i>Calculus & Mathematica</i> ¹	Fall 2008, Fall 2009
MATH 181 A Mathematical World	Summer 2006

¹ Course uses *Mathematica* to aid visualization and develop conceptual understanding.

² Capstone course on topics in mathematical modeling in collaboration with local institutions.

Teaching Awards

- 2014 Certificate of Recognition for Contributions to Students recipient, UNL.
- *Awarded based on nominations by students and parents.*
- 2010 Nominated for teaching award within the Mathematics Department, UIUC.
- 2008,2009 Appeared on the List of Teachers Ranked as Excellent by their students, UIUC.
- *Awarded for at least 4.3/5 on "Teaching Effectiveness" in student evaluations.*

Graduate Students Supervised

- 2016–present Thesis advisor and supervisory committee chair for
- Benjamin Drabkin (since 02/2016)
 - Andrew Conner (since 03/2017)
 - Erica Musgrave (since 02/2018) – coadvised with Mark Walker
- 2015–present Supervisory committee (dissertation reader) for Solomon Akesseh, Douglas Dailey, Brittney Falahola, Mohsen Gheibi, Su Ji Hong, Amadeus Martin, John Meyers, Matthew Mills, George Nasr, Nicholas Packauskas, Joshua Pollitz, Neil Steinburg.

Undergraduate Research Supervised

- 05-07/2017 *The Waldschmidt constant and symbolic powers of monomial ideals* – Diana Zhong
- presented a talk at the Central States Mathematics Undergraduate Conference
- 03-04/2015 *Tropical rank for phylogenetic metrics* – Cashous Bortner, Kaylee Homolka, William Morgan, Jack Rodenburg
- in the framework of the Collaborative Research Project in mathematics
- 2013–2015 *Unimodality for independence sequences of well-covered graphs of small type*
- undergraduate thesis by Joey Becker – supported by a UCARE grant
- 04/2014 *The Rollercoaster Conjecture* – poster presented by Joseph Becker
- UNL Research Fair Undergraduate Poster Session
- 02/2014 *Sustainability of Nebraska Groundwater Reservoirs* –Angie Loong, Katie Pawlowski, Helen Pitts, Jacqui Voss and Shalima Zalsha
- Nebraska Undergraduate Conference for Women in Mathematics
- UNL Research Fair Undergraduate Poster Session

Outreach

Undergraduate Research

- 2017–present Organizer for the Central States Mathematics Undergraduate Conference
- *A conference showcasing research performed by undergraduate students.*
- 2015–present Organizer for the lecture series Career Perspectives in Mathematics.
- *Featuring professional success stories from UNL mathematics alumni.*

Women in Mathematics

- 2016 Invited speaker by the Association for Women in Mathematics student chapter at the University of Illinois at Urbana-Champaign.

Mathematics Education

- 01/2014 Math in the City: connecting the classroom to the local community through mathematical modeling, *Joint Mathematics Meetings, Baltimore, MD.*
- *MAA special session on Instructional Approaches to Increase Awareness of the Societal Value of Mathematics*
- 2013 Co-organizer for the *Math in the City Workshop* for external faculty development
www.math.unl.edu/~math-mitc/workshop2013

Service to profession

- Reviewer for the NSF Algebra and Number Theory Grant Program.
Reviewer for the NSA Mathematical Sciences Grant Program.

2011–present Referee for the following journals (number of papers reviewed):

- Advances in Applied Mathematics,
- Geometriae Dedicata,
- Illinois Journal of Mathematics (2),
- International Journal of Algebra and Computation,
- Journal of Algebra (3),
- Journal of Algebra and Its Applications,
- Journal of Algebraic Combinatorics,
- Journal of Commutative Algebra (4),
- Journal of the London Mathematical Society,
- Journal of Pure and Applied Algebra (3),
- Journal of Software for Algebraic Geometry (2),
- Journal of Symbolic Computation,
- Mathematische Zeitschrift,
- Proceedings of the American Mathematical Society (3).

Internal service

- 2017–2019 Mathematics Department Executive Committee member.
- 2013–present Undergraduate Activities Committee member (co-chair 2016–2017, chair 2017–2019).
- *Faculty advisor to Math Club & Pi Mu Epsilon.*
- 2016–present AMS graduate student chapter faculty advisor.
- 2015–2017 Mathematics Department Graduate Advisory Committee member.
- *Temporary advisor for five graduate students in their first and second year of studies.*
- 2016–present Teaching mentor for three graduate students in mathematics
- *Advised instructors regarding course policies, instruction procedures and exams.*
- 2017 Ad-hoc Search Committee for the Chair of the Mathematics Department member.
- 2014–2017 Mentor for two undergraduate students in the Nebraska Math program
- *Advised students regarding course selection and career options.*
- 2013 Undergraduate Creative Activities and Research interdisciplinary selection committee
- *Reviewed research project proposals from undergraduate students for funding.*
- 2012 Nebraska Conference for Undergraduate Women in Math–organized faculty program.
- 2011, 2013 Putnam contest training – led problem solving sessions for UNL students.

Computational Algebra Software Development

Software developer for the computer algebra program *Macaulay2*. Software packages developed or contributed to:

- Generic Initial Ideal,
- Regularity,
- Symmetric Polynomials,
- Big Ideals,
- Normal Toric Varieties,
- SymbolicPowers.

Professional Memberships

AMS (American Mathematical Society)

AWM (Association for Women in Mathematics).