# Michael DiPasquale


CONTACT INFORMATION

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Department of Mathematical Sciences

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RESEARCH INTERESTS

Computational commutative algebra and algebraic geometry. Emphasis on pure and applied problems which can be approached with the tools of algebraic geometry and commutative algebra.

EDUCATION

**University of Illinois Urbana-Champaign** (UIUC), Urbana, IL
**Ph.D.**, Mathematics, May 2015
*Advisor:* Professor Hal Schenck
*Thesis:* Splines on polytopal complexes
**Wheaton College**, Wheaton, IL
**B.S.**, Mathematics, May 2009

ACADEMIC APPOINTMENTS

**New Mexico State University** (NMSU), Las Cruces, NM
*Assistant Professor* August 2023 -
**University of South Alabama** (USA), Mobile, AL
*Assistant Professor* August 2021 - May 2023
**Colorado State University** (CSU), Fort Collins, CO
*Postdoctoral Fellow* August 2018 - July 2021
**Oklahoma State University** (OSU), Stillwater, OK
*Visiting Assistant Professor* August 2015 - May 2018

PUBLICATIONS

27. *Geometric aspects of the Jacobian of a hyperplane arrangement* (with J. Sidman and W. Traves), Int. Math. Res. Not. IMRN 2025, no. 13, rnaf172.. arXiv:2209.04929.
26. *Restriction and extension for planar splines on triangulations*, in Lanini, Manni, and Schenck, editors, *Approximation Theory and Numerical Analysis meet Algebra, Geometry, Topology*, Springer INdAM Series 60 (2024), 149-172. Springer Nature Link page
25. *Planar splines on a triangulation with a single totally interior edge* (with B. Yuan), SIAM J. Appl. Algebra Geom. 8 (2024), no. 3, 686–712. arXiv:2306.16825
24. *A lower bound for the dimension of tetrahedral splines in large degree* (with N. Villamizar), Constr. Approx. 59 (2024), no. 1, 1–30. arXiv:2007.12274
23. *Duality for asymptotic invariants of graded families* (with T. Nguyen and A. Seceleanu), Adv. Math. 430 (2023), Paper No. 109208, 47 pp. arXiv:2208.11110
22. *Quasi-polynomial growth of numerical and affine semigroups with constrained gaps* (with B. Gillespie and C. Peterson), Semigroup Forum 107 (2023), no. 1, 60–78. arXiv:2208.09760
21. *A homological characterization for freeness of multi-arrangements*, Math. Ann. 385 (2023), no. 1-2, 745–786. arXiv:1806.05295
20. *On resurgence via asymptotic resurgence* (with B. Drabkin), J. Algebra. 587 (2021), 64-84. arXiv:2003.06980
19. *Koszul multi-Rees algebras of principal L-Borel Ideals* (with B. Jabbar Nezhad), J. Algebra. 581 (2021), 353-385. arXiv:2008.09565
18. *A lower bound for splines on tetrahedral vertex stars* (with N. Villamizar), SIAM J. Appl. Algebra Geom. 5 (2021), no. 2, 250-277. arXiv:2005.13043
17. *Counting the dimension of splines of mixed smoothness: A general recipe, and its application to meshes of arbitrary topologies.* (with D. Toshniwal), Adv. Comput. Math. (2021) arXiv:2001.01774
16. *On the apolar algebra of a product of linear forms* (with Z. Flores and C. Peterson). In *Proceedings of the 45th International Symposium on Symbolic and Algebraic Computation*, ISSAC '20, pages 130-137, New York, NY, USA, 2020. Association for Computing Machinery,

arXiv:2002.04818

15. *A Generalization of Wilf's Conjecture for Generalized Numerical Semigroups* (with C. Cisto, G. Failla, Z. Flores, C. Peterson, and R. Utano), Semigroup Forum 101 (2020). arXiv:1909.13120
14. *Bivariate Semialgebraic Splines* (with F. Sottile), J. Approx. Theory 254 (2020), 105392, 19 pp. arXiv:1905.08438
13. *Free and non-free multiplicities on the $A_3$ arrangement* (with C. Francisco, J. Mermin, and J. Schweig), J. Algebra 544 (2020), 498-532. arXiv:1609.00337
12. *Asymptotic resurgence via integral closures* (with C. Francisco, J. Mermin, and J. Schweig), Trans. Amer. Math. Soc. 372 (2019), no. 9, 6655-6676. arXiv:1808.01547
11. *The Rees algebra of a two-Borel ideal is Koszul* (with C. Francisco, J. Mermin, J. Schweig, and G. Sosa), Proc. Amer. Math. Soc. 147 (2019), no. 2, 467-479. arXiv:1706.07462
10. *Free multiplicities on the moduli of $X_3$* (with M. Wakefield), J. Pure Appl. Algebra 222 (2018), no. 11, 3345-3359. arXiv:1707.03961
9. *Inequalities for free multi-braid arrangements*, Proc. Japan Acad. Ser. A Math. Sci. 94 (2018), no. 4, 36-41. arXiv:1705.02409
8. *Dimension of mixed splines on polytopal cells*, Math. Comp. 87 (2018), no. 310, 905-939. arXiv:1411.2176
7. *Semialgebraic splines* (with F. Sottile and L. Sun), Comput. Aided Geom. Design 55 (2017), 26-47. arXiv:1604.05947
6. *Generalized splines and graphic arrangements*, J. Algebraic Combin. (2016), 1-19. arXiv:1606.03091
5. *Associated primes of spline complexes*, J. Symb. Comput. (2016), 158-199. arXiv:1410.6894
4. *Lattice-supported splines on polytopal complexes*, Adv. in Appl. Math. 55 (2014), 1-21. arXiv:1312.3294
3. *Shellability and freeness of continuous splines*, J. Pure Appl. Algebra. 216 (2012), 2519-2523.
2. *Asymptotic connectivity of hyperbolic planar graphs* (with P. Bahls), Discrete Math. 310 (2010), 3462-3472.
1. *On the order of a group containing nontrivial Gassmann equivalent subgroups*, Rose-Hulman Undergraduate Mathematics Journal 10, Issue 1 (2009).
0. *Splines on polytopal complexes.* Thesis (Ph.D.) University of Illinois at Urbana-Champaign (2015). 148 pp. ISBN: 978-1339-32551-4, ProQuest LLC.

## Under review

1. *Generalized Hamming weights and symbolic powers of Stanley-Reisner ideals of matroids* (with L. Fouli, A. Kumar, and S. Tohăneanu), submitted. arXiv:2406.13658.

## External Grants

PI, NSF standard grant DMS-2201084/2344588 (2022-2025)
AMS-Simons travel grant (2015-2018)

## Internal awards

USA Support and Development Award (2022)
$1500 for bringing collaborators and speakers to USA
USA Faculty Development Council Fellow (2022)
$5000 for research collaboration and development of external grant application

## Teaching Experience

**Instructor of record**

| Course | Description |
|---|---|
| Abstract algebra II (NMSU) | second grad course in algebra |
| Commutative algebra and algebraic geometry (NMSU) | grad course on solving polynomial systems |
| Intro Modern Algebra (CSU, USA, NMSU) | group theory and proof writing |
| Intro to Math Reasoning (CSU, NMSU) | proof writing |
| Linear Algebra (CSU, USA, NMSU) | matrix theory |
| Precalculus Trigonometry (USA) | trigonometric functions and modeling |
| Finite Mathematics (USA) | probabilities, counting, and logic for non-math majors |
| Intro to Combinatorial Theory (CSU) | combinatorics and number theory |
| Calculus 2 (CSU, USA) | sequences, series, and integration techniques |
| Intro to Real Analysis (OSU) | proof writing and real analysis |
| Calculus 1 (OSU) | differential and integral calculus |
| A Mathematical World (UIUC) | survey course emphasizing applications of mathematics |
| College Algebra (UIUC) | calculus preparation course |

- Responsible for lecturing, grading exams and quizzes, writing worksheets and homework
- Wrote exams for most courses
- Often implemented group work at least once per week

**Recitation instructor**, University of Illinois Urbana-Champaign
- Led bi-weekly 50-minute problem sessions and proctored and graded quizzes and exams for seven semesters of Calculus (1,2, and 3)
- Led student groups through worksheets I had written during bi-weekly two-hour workhsops for one semester of Calculus 1 in the Merit program
- Appeared on the 'List of Teachers Ranked as Excellent' by their students in three semesters

**Undergraduate teaching assistant**, Wheaton College
- Led problem sessions once per week at Wheaton College for Analysis I, Algebra I, and Discrete Mathematics

## Students supervised

Research Assistantship for Jackson West (2024-2025)
Non-thesis masters advisor for Sean Palmer (2023-2024)
Masters thesis advisor for Ryann Firestine (2022-2023)

## Mentoring

**Assistant** for a minicourse on Algebraic Geometry at SMI in Perugia — Summer 2019
*Created problem sets and ran Macaulay2 help sessions twice per week.*

**Honors option** for Intro to Math Reasoning, Linear Algebra, Calculus 2 — Fall 2019, 2020, 2022
*Created additional problem sets and problem sessions for students to receive honors credit.*

**Mentor** in the Illinois Geometry Lab — Spring 2014, Fall 2014
*Co-led undergraduate research on minimal energy configurations of particles.*

**Teaching mentor** for junior graduate students — Fall 2013
*Mentored several first-year graduate students, visited classes and offered teaching feedback.*

## Dissemination of Research

Lead co-author of the package AlgebraicSplines for the computer algebra system Macaulay2. This package is currently used by several researchers, including Julianna Tymoczko, who employs this package in research with undergraduates at Smith College.

## Conference Presentations

1. Splines and hyperplane arrangements 05/2025
   Workshop on Applications of Commutative Algebra at the Fields Institute, Toronto, Canada
2. Generalized Hamming weights and symbolic powers of Stanley-Reisner ideals of matroids 02/2025
   Workshop on Computational Interactions between Algebra, Combinatorics, and Discrete Geometry, Institute for Pure and Applied Mathematics (IPAM), CA
3. *Rank equations for unexpected dimension of planar $C^1$ cubic splines* 09/2024
   AMS Sectional Meeting, San Antonio, TX
   *Special Session on Applications of Algebraic Geometry*
4. *A case study in bivariate semialgebraic splines* 04/2024
   AMS Sectional Meeting, Milwaukee, WI
   *Special Session on Connections between Commutative Algebra and Algebraic Combinatorics*
5. *Saturation of the Jacobian ideal of a hyperplane arrangement in minimal degree* 12/2023
   Hyperplane Arrangements 2023 at Rikkyo University, Tokyo, Japan
6. *Lex-segment initial ideals and the dimension of planar splines* 11/2023
   SIAM Texas-Louisiana Sectional Meeting, Lafayette, Louisiana
   *Minisymposium on applications of combinatorial and computational algebraic geometry*
7. *Restriction and Extension for Planar Splines* 07/2023
   SIAM Conference on Applied Algebraic Geometry, Eindhoven, Netherlands
   *Minisymposium on Algebraic Spline Geometry*
8. *Dimension of bivariate splines on a partition with one totally interior edge* 05/2023
   International Conference on Approximation Theory and Beyond, Nashville, TN
   *Minisymposium on Multivariate Splines: Theory and applications*
9. *Apolarity for differentially closed filtrations of ideals* 03/2023
   AMS Sectional Meeting, Atlanta, GA
   *Special Session on Recent Developments in Commutative Algebra*
10. *Curves passing through space points and Waring rank* 01/2023
    Joint Mathematics Meetings, Boston, MA
    *AMS Special Session on Applied Enumerative Geometry*
11. *Singularities of line arrangements and rigidity of planar frameworks* 12/2022
    Virtual workshop organized by Mustapha Lahyane (University of Michoacán, Mexico)
    *Commutative Algebra, Algebraic Geometry and Related Topics*
12. *Homogeneous trivariate splines on the star of a vertex* 09/2022
    INdAM Meeting in Cortona, Italy
    *Approximation Theory and Numerical Analysis meet Algebra, Geometry, Topology*
13. *Duality for sequences associated to symbolic powers* 05/2022
    AMS Sectional Meeting, Denver, CO (virtual due to COVID-19)
    *Special Session on Commutative Algebra*
14. *Saturating the Jacobian ideal of a line arrangement and parallel drawings* 3/2022
    AMS Sectional Meeting, Purdue, IN (virtual due to COVID-19)
    *Special Session on Combinatorial Techniques in Commutative Algebra*
15. *Rigidity, formality, and syzygies of the module of derivations of a line arrangement* 10/2021
    AMS Sectional Meeting, Albuquerque, NM (virtual due to COVID-19)
    *Special Session on Hyperplane arrangements in connection with commutative algebra*
16. *Curves passing through points in projective space* 10/2021
    AMS Sectional Meeting, Omaha, NE (virtual due to COVID-19)
    *Special Session on Commutative Algebra*
17. *Continuous splines on cross-cut cells and rigid planar frameworks* 08/2021
    SIAM Conference on Applied Algebraic Geometry (virtual due to COVID-19)
    *Minisymposium on Algebraic Methods for Multivariate Splines and Rigidity*
18. *Koszul multi-Rees algebras arising from principal Borel ideals* 03/2021
    AMS Sectional Meeting, Providence, RI (virtual due to COVID-19)
    *Special Session on Current Trends in Combinatorial Commutative Algebra*

19. *Dual sequences arising from apolarity* 03/2021
    AMS Sectional Meeting, Atlanta, GA (virtual due to COVID-19)
    *Special Session on Commutative Algebra and its Interaction with Algebraic Geometry and Combinatorics*
20. *Formal line arrangements and rigid planar frameworks* 01/2021
    Mathematisches Forschungsinstitut Oberwolfach, Germany (virtual due to COVID-19)
    *Workshop on Logarithmic Vector Fields and Freeness of Divisors and Arrangements*
21. *Regularity of uniform power ideals and the Waldschmidt constant* 10/2020
    AMS Sectional Meeting, University Park, PA (virtual due to COVID-19)
    *Special Session on Commutative Algebra and Connections to Algebraic Geometry and Combinatorics*
22. *On the apolar algebra of a product of linear forms* 07/2020
    The 45th International Symposium on Symbolic and Algebraic Computation, ISSAC '20 (virtual due to COVID-19)
23. (**Cancelled due to COVID-19**) *Generalizing Wilf's conjecture to higher dimensions* 05/2020
    AMS Sectional Meeting, Fresno, CA
    *Special Session on Numerical Semigroups and Applications*
24. (**Cancelled due to COVID-19**) *A linear bound on the regularity of power ideals* 04/2020
    AMS Sectional Meeting, West Lafayette, IN
    *Special Session on Combinatorial Techniques in Commutative Algebra*
25. *A generalization of Wilf's Conjecture* 01/2020
    AMS-MAA Joint Mathematics Meetings, Denver, CO
    *AMS Special Session on Recent Trends in Semigroup Theory*
26. *Apolarity and trivariate piecewise polynomials* 08/2019
    Algebraic Spline Geometry Meeting, Swansea, United Kingdom
27. *Algebraic Approaches to Spline Theory* 07/2019
    SIAM Conference on Applied Algebraic Geometry, Bern, Switzerland
    *Minisymposium on Multivariate Spline Approximation and Algebraic Geometry*
28. *Asymptotic Resurgence via Integral Closure and Linear Programs* 02/2019
    Southwest Local Algebra Meeting, El Paso, TX
29. *Asymptotic Resurgence and Integral Closures* 11/2018
    AMS Sectional Meeting, Fayetteville, AR
    *Special Session on Interactions Between Combinatorics and Commutative Algebra*
30. *Freeness of Multi-arrangements via Acyclicity* 06/2018
    Research Institute for Mathematical Sciences (RIMS), Kyoto, Japan
    *Matroids, reflection groups, and free hyperplane arrangements*
31. *A Homological Approach to Freeness of Multi-arrangements* 04/2018
    AMS Sectional Meeting, Boston, MA
    *Special Session on Arrangements of Hypersurfaces*
32. *The Toric Ring of a Two-Borel ideal is Koszul* 01/2018
    AMS-MAA Joint Mathematics Meetings, San Diego, CA
    *AMS Special Session on Combinatorial Commutative Algebra and Polytopes*
33. *Freeness of Multi-Coxeter Arrangements of type A* 09/2017
    AMS Sectional Meeting, Denton, TX
    *Special Session on Algebraic Combinatorics of Flag Varieties*
34. *Splines on planar semi-algebraic partitions* 09/2017
    AMS Sectional Meeting, Denton, TX
    *Special Session on Applicable and Computational Algebraic Geometry*
35. *Algebraic Methods in Spline Theory* 08/2017
    SIAM Conference on Applied Algebraic Geometry, Atlanta, GA
    *Minisymposium on Multivariate Splines and Algebraic Geometry*

36. *Multi-derivations on the moduli of the $X_3$ arrangement* 04/2017
AMS Sectional Meeting, Pullman, WA
*Special Session on Combinatorial and Computational Commutative Algebra and Algebraic Geometry*
37. *Splines on Tetrahedral Decompositions* 05/2016
15th International Conference on Approximation Theory, San Antonio, TX
*Minisymposium on Approximation Theory and Algebraic Geometry*
38. *Generalized Splines and Graphic Multi-Arrangements* 10/2015
AMS Sectional Meeting, Chicago, IL
*Special Session on Combinatorial and Computational Algebra*
39. *Piecewise Polynomials and Regularity* 04/2015
Mathematisches Forschungsinstitut Oberwolfach, Germany
*Workshop on Multivariate Splines and Algebraic Geometry*
40. *Castelnuovo-Mumford Regularity of Mixed Spline Spaces* 01/2015
AMS-MAA Joint Mathematics Meetings, San Antonio, TX
*Session on Commutative Algebra*
41. *Regularity of Planar Splines* 04/2014
AMS Sectional Meeting, Lubbock, TX
*Special Session on Commutative Algebra and Algebraic Geometry*
42. *Regularity and Piecewise Polynomial Functions* 04/2014
KUMUNU jr, Lincoln, NE
43. *Local Properties of Splines* 03/2014
Southwest Local Algebra Meeting, College Station, TX
*Graduate Student Poster Session*
44. *Lattice-Supported Splines on Polytopal Complexes* 01/2014
AMS-MAA Joint Mathematics Meetings, Baltimore, MD
*AMS Special Session on Hyperplane Arrangements and Applications*
45. *Lattice-Supported Bases for Polyhedral Splines* 08/2013
SIAM Conference on Applied Algebraic Geometry, Fort Collins, CO
*Session on Approximation Theory, Geometric Modeling, and Algebraic Geometry*
46. *Bivariate Continuous Splines on Polyhedral Complexes* 04/2013
14th International Conference on Approximation Theory, San Antonio, TX
*Minisymposium on Multivariate Splines*
47. *Shellability and Freeness of Continuous Splines* 10/2012
AMS Sectional Meeting, Tulane, LA
*Special Session on Approximation Theory, Geometric Modelling, and Algebraic Geometry*
48. *Exploring Gassmann Triples* 01/2009
AMS-MAA Joint Mathematics Meetings
*Undergraduate Student Poster Session ($100 prize)*

## Seminar & Colloquium Talks

1. *Hyperplane arrangements: combinatorics, the module of derivations, and the Jacobian ideal* 02/2025
Series of two talks for the Algebra Seminar, NMSU
2. *A bridge between the algebra and geometry of hyperplane arrangements* 10/2024
Algebra and Geometry Seminar, University of New Mexico, Albuquerque, NM
3. *Inverse systems, symbolic powers, and sequence duality* 09-10/2024
Series of two talks for the Algebra Seminar, NMSU
4. *Connecting the algebra and geometry of line arrangements via rigidity theory* 03/2024
Colloquium, University of Idaho, Moscow, ID
5. *Extremal syzygies of line arrangements and rigidity of planar frameworks* 02/2024
Virtual talk for TATERS seminar hosted by Boise State University, Boise, ID
6. *An introduction to symbolic powers and asymptotics of the containment problem* 02/2024
Series of two talks for the Algebra Seminar, NMSU

7. *Koszul Rees Algebras of Borel Ideals* 08/2023
   Algebra Seminar, NMSU
8. *Two perspectives on affine semigroups* 08/2023
   Colloquium, New Mexico State University, Las Cruces, NM
9. *Saturating the Jacobian ideal of a line arrangement via rigidity theory* 03/2023
   Algebra Seminar, Georgia Institute of Technology, Atlanta, GA
10. *Exploring affine semigroups* 04/2022
    Colloquium, University of Texas at Tyler, Tyler, TX (virtual due to COVID-19)
11. *A duality for sequences and its manifestation for symbolic powers* 03/2022
    Algebraic Geometry and Geometric Topology Seminar, Tulane University, New Orleans, LA
12. *Homogeneous trivariate splines on vertex stars* 05/2021
    Online workshop *Dimension of Multivariate Splines*, University of Rome "Tor Vergata"
13. *Wilf's conjecture and its extensions* 11/2020
    Graduate Seminar, Towson University, Towson, MD (virtual due to COVID-19)
14. *Resurgence via Asymptotic Resurgence* 08/2020
    Algebra and Geometry Seminar, Iowa State University, Ames, IA (virtual due to COVID-19)
15. *Extending Wilf's Conjecture* 10/2019
    Colloquium, University of North Carolina-Charlotte, Charlotte, NC
16. *Multi-derivations of hyperplane arrangements* 06/2019
    Mediterranea University of Reggio Calabria, Italy
17. *Combinatorics, topology, and algebra of hyperplane arrangements* 06/2019
    University of Messina, Italy
18. *Commutative Algebra and Piecewise Polynomials* 02/2018
    Colloquium, Marquette University, Milwaukee, WI
19. *Commutative Algebra and Approximation Theory* 01/2018
    Colloquium, University of Nebraska-Lincoln, Lincoln, NE
20. *Homological Obstructions to Freeness of Multi-Arrangements* 10/2017
    Geometry Seminar, Texas A&M University, College Station, TX
21. *Free Multi-Braid Arrangements and Resolutions* 03/2017
    Algebra Seminar, University of Arkansas, Fayetteville, AK
22. *Dimensions of Spline Spaces and Commutative Algebra* 11/2016
    Colloquium, Towson University, Towson, MD
23. *Two Tales of Freeness* 11/2016
    Colloquium, US Naval Academy, Annapolis, MD
24. *Multi-Derivations of Braid Arrangements* 09/2016
    Combinatorics Seminar, University of Kansas, Lawrence, KS
25. *Piecewise Polynomials and Algebraic Geometry* 04/2016
    Colloquium, University of Idaho, Moscow, ID
26. *Semialgebraic Splines* 03/2016
    Valley Geometry Seminar, University of Massachusetts, Amherst, MA
27. *Commutative Algebra meets Approximation Theory* 11/2015
    Numerical Analysis Seminar, Oklahoma State University, Stillwater, OK
28. *Commutative Algebra and Approximation Theory* 09/2015
    Colloquium, Oklahoma State University, Stillwater, OK
29. *Splines, Syzygies, and Freeness* 09/2015
    Algebra Seminar, Oklahoma State University, Stillwater, OK
30. *Regularity of Planar Splines* 09/2015
    Geometry Seminar, Texas A&M University, College Station, TX
31. *Algebraic Geometry and Approximation Theory* 02/2015
    Colloquium, University of South Florida, Tampa, FL
32. *Associated Primes of Complexes Arising in Approximation Theory* 11/2014
    Commutative Algebra Seminar, UIUC
33. *Castelnuovo-Mumford Regularity in Approximation Theory* 11/2014
    Algebraic Geometry Seminar, UIUC

34. *Lehmer's Picturesque Exponential Sums with a Twist (with Daniel Schultz)* 02/2010
Number Theory Seminar, UIUC

## Talks for Undergraduate or High School audiences

1. *Cutting up a pizza and related topics* 10/2021
Colloquium, University of South Alabama, Mobile, AL
2. *Piecewise Linear Functions, Projecting Polytopes, and Equilibrium Stresses* 11/2018
Symposium of Physics and Mathematics FCFM-IFM, Universidad Michoacana de San Nicolás de Hidalgo, Morelia, Michoacán, Mexico
3. *Explorations in Rigidity* 04/2018
OSU Math Club, Oklahoma State University, Stillwater OK
4. *The Best Way to Divide up a Cheese* 10/2017
High School Math Day, Oklahoma State University, Stillwater OK
5. *The Pizza Cutting Problem* 02/2017
Stillwater High School Math Seminar, Stillwater High School, Stillwater, OK
6. *Counting Piecewise Linear Functions* 03/2016
Center for Women in Mathematics, Smith College, Northampton, MA
7. *Jumping Dimensions and Projecting Polytopes* 12/2014
Colloquium, Bradley University, Peoria, IL
8. *Continuous Piecewise Polynomials and Static Equilibrium* 10/2014
Rose-Hulman Mathematics Seminar, Terra-Haute, IN

## Professional Development

**Participant**, NMSU-MÁS (Mejorando las Aulas en STEM / Improving STEM Classrooms)
Worked in small teams and attended workshops to learn about and implement active learning techniques in the classroom during fall 2024 and spring 2025. As part of this program, implemented inquiry-based learning (IBL) approach for MATH 1531 - Introduction to Higher Mathematics, in spring 2025.

**Participant** in NMSU PI Academy
In fall 2023 and spring 2024, attended workshops on grant-writing and agencies to target for funding opportunities.

## Professional Service

**Co-organizer** (with Louiza Fouli and Jonathan Montaño)
Arizona-New Mexico Symposium on Commutative Algebra and its Interactions: Geometric Combinatorics, Las Cruces, NM, December 2025

**Co-mentor** (with Nelly Villamizar)
Focus group on *Approximation Theory* during the Workshop on the Applications of Commutative Algebra at the Fields Institute, Toronto, Canada, May 2025

**Co-organizer** (with Louiza Fouli and Arvind Kumar)
AMS Special Session on Commutative Algebra and its connections to combinatorics, San Antonio, TX, September 2025.

**Co-organizer** (with Louiza Fouli and Arvind Kumar)
AMS Special Session on Recent Developments in Commutative Algebra, San Francisco, CA, May 2024.

**Organizer**
Virtual informal seminar on topics related to splines, Fall 2020-

**Co-organizer** (with Hendrik Speleers and Deepesh Toshniwal)
Minisymposium on Multivariate Splines: Theory and applications at the International Conference on Approximation Theory and Beyond, Nashville, TN, May 2023.

**Co-organizer** (with Selvi Kara)
AMS Special Session on Current Trends in Combinatorial and Homological Commutative Algebra, Mobile, AL, November 2021.

**Organizer**
Postdoc Seminar at CSU, Fall 2020, Spring 2021

**Co-organizer** (with Nelly Villamizar)
Minisymposium on Algebraic Methods for Multivariate Splines and Rigidity at the SIAM conference on Applied Algebraic Geometry in College Station, Texas, August 2021. (**Virtual due to COVID-19**)

**Co-organizer** (with Nelly Villamizar)
Minisymposium on Multivariate Spline Approximation and Algebraic Geometry at the SIAM conference on Applied Algebraic Geometry in Bern, Switzerland, July 2019.

**Co-organizer** (with Frank Sottile)
Minisymposium on Multivariate Splines and Algebraic Geometry at the SIAM conference on Applied Algebraic Geometry in Atlanta, GA, August 2017.

**Co-organizer** (with Tatyana Sorokina)
Minisymposium on Approximation Theory and Algebraic Geometry at the 15th International Conference on Approximation Theory in San Antonio, TX, May 2016.

**Organizer**
reading seminar on *The Geometry of Syzygies* in Fall 2011, Spring 2012

**Referee**
I have served as a referee for articles submitted to the following journals: *Mathematische Annalen*, *Journal of Pure and Applied Algebra*, *International Journal of Algebra and Computation*, *Pacific Journal of Mathematics*, *Constructive Approximation*, *Computer-Aided Geometric Design*, *Journal of Algebraic Combinatorics*, *Graphs and Combinatorics*, *Proceedings of 15th International Conference on Approximation Theory*, *SIGMA*, *Journal of Computational and Applied Mathematics*, *Canadian Mathematical Bulletin*, *Communications in Algebra*, *Épijournal de Géométrie Algébrique*, *Advances in Applied Mathematics*, *Innovations in Incidence Geometry*, *Discrete and Computational Geometry, Arkiv för Matematik, Collectanea Mathematica*, *Hokkaido Mathematical Journal*, *Journal of Algebra and its Applications*, *ISSAC*, *Mathematics of Computation*

## Other Awards

**Bourgain Fellowship**, UIUC — Spring 2013
**REGS Summer Fellowships**, UIUC — Summer 2009-2013
**REU Summer Fellowships**, UNC Asheville & LSU — Summer 2008-2009

## Conference-Specific Grants

**US Junior Oberwolfach Fellows grant** — 01/2020
to attend MFO workshop in Oberwolfach, Germany (not used since the conference was virtual)

**SIAM Early Career Travel Award** — 07/2019
to attend SIAM Conference on Applied Algebraic Geometry in Bern, Switzerland

**Supported Participant** — 05/2017
at CMO Workshop on Symbolic and Ordinary Powers in Oaxaca, Mexico

**Oberwolfach Liebniz Graduate Students grant** — 04/2015
to present at MFO workshop in Oberwolfach, Germany

**AMS Student Travel Grant** — 04/2014
for presentation at AMS Sectional Meeting at Texas Tech

**AMS Student Travel Grant** — 01/2014
for presentation at AMS-MAA Joint Mathematics Meetings

**Student Travel Award** — 08/2013
to attend SIAM Conference on Applied Algebraic Geometry in Fort Collins, CO

**Travel Award** — 04/2013
for presentation at 14th International Conference on Approximation Theory

**Supported Participant** — 12/2012
at MSRI Workshop on Combinatorial Commutative Algebra

**AMS Student Travel Grant** — 10/2012
for presentation at the AMS Sectional Meeting at Tulane

**Supported Participant** — 06-07/2012
at IMA summer school in Applied Algebraic Geometry at Georgia Tech

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|---|---|---|
| Selected Workshops Attended | **Fields Institute:** Workshop on Applications of Commutative Algebra<br>Toronto, Canada | 05/2025 |
| | **IPAM:** Workshop on Computational Interactions between Algebra, Combinatorics, and Discrete Geometry<br>Los Angeles, CA | 02/2025 |
| | **INDAM Meeting:** Approximation Theory and Numerical Analysis meet Algebra, Geometry, Topology<br>Cortona, Italy | 09/2022 |
| | **MFO workshop** on Logarithmic Vector Fields and Freeness of Divisors and Arrangements: New perspectives and applications<br>Oberwolfach, Germany | 01/2021 |
| | **Macaulay 2 workshop** on coding in the computer algebra system Macaulay2<br>Berkeley, CA | 07/2017 |
| | **CMO workshop** on Ordinary and Symbolic Powers of Ideals<br>Oaxaca, Mexico | 05/2017 |
| | **Macaulay2 workshop** on coding in the computer algebra system Macaulay2<br>Boise, ID | 05/2015 |
| | **MFO workshop** on Multivariate Splines and Algebraic Geometry<br>Oberwolfach, Germany | 04/2015 |
| | **MSRI workshop** on Combinatorial Commutative Algebra<br>San Francisco, CA | 12/2012 |
| | **IMA summer school** in Applied Algebraic Geometry at Georgia Tech<br>Atlanta, GA | 06-07/2012 |

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| Professional Memberships | American Mathematical Society |
| | Society for Industrial and Applied Mathematics<br>Member of activity group on applied algebraic geometry |