

Daniel J. Hernández

EDUCATION

- 2011 University of Michigan | Ph.D. | Mathematics
Dissertation: *F*-purity of hypersurfaces
Advisor: [Professor Karen E. Smith](#)
- 2005 Boston University | B.S. | Mathematics
Summa Cum Laude | College Prize in Mathematics | Phi Beta Kappa

APPOINTMENT HISTORY

- 2022 Visiting Associate Professor, Fall 2022 | Cornell University
- 2020 — Associate Professor | University of Kansas
- 2016 — 2020 Assistant Professor | University of Kansas
- 2015 NSF Postdoctoral Fellow | University of Michigan
- 2013 — 2015 NSF Postdoctoral Fellow | University of Utah
- 2013 Postdoctoral Fellow | MSRI
- 2011 — 2013 Dunham Jackson Assistant Professor | University of Minnesota

GRANTS & FELLOWSHIPS

- 2019 – 2022 NSF Standard Grant DMS #1902321
- 2017 – 2020 American Institute of Mathematics SQuaRE collaboration grant
- 2016 – 2019 NSF Standard Grant DMS #1600702
- 2016 NSF Conference Grant DMS #1645050 for KUMUNU 2016
- 2013 – 2016 NSF Postdoctoral Research Fellowship DMS #1304250
- 2016 KU New Faculty General Research Fund Grant
- 2012 – 2013 The National Academies of Sciences, Engineering, and Medicine
Ford Foundation Postdoctoral Fellowship
- 2008 – 2010 NSF RTG Fellowships
- 2005 – 2007 Rackham Merit Fellow

AWARDS & HONORS

- 2021 [KU Libraries Textbook Hero](#)
This honor recognizes members of the KU community who work to increase access to and affordability of required course materials by implementing and advocating for open educational resources (OER) and other low and no cost course materials
- 2021 Math GSO G. Baley Price Award for Excellence in Teaching
This award, presented by the Math Graduate Student Organization (GSO) at KU, recognizes excellence in teaching graduate mathematics courses.
- 2020 [Don and Pat Morrison Foundation Award for Excellence in Teaching](#)
This annual award recognizes one outstanding faculty member's ability and desire to motivate students toward a deeper understanding of mathematics.
- 2018 [Grant Goodman Undergraduate Mentor Award](#)
This award recognizes one outstanding faculty member in the College of Liberal Arts & Sciences at KU for exemplary mentoring of undergraduate students
- 2010 [Outstanding Graduate Student Instructor Award](#)
A university-wide teaching award from the University of Michigan

ARTICLES

- Jumping numbers of F -pure submodules
With Alessandro De Stefani, Luis Núñez Betancourt, and Emily E. Witt
submitted.
- [Bernstein's inequality and holonomicity for certain singular rings](#)
With Josep Álvarez Montaner, Jack Jeffries, Luis Núñez Betancourt, Pedro Teixeira, and Emily E. Witt
submitted.
- [Bernstein-Sato functional equations, \$V\$ -filtrations, and multiplier ideals of direct summands](#)
With Josep Álvarez Montaner, Jack Jeffries, Luis Núñez Betancourt, Pedro Teixeira, and Emily E. Witt
To appear in *Communications in Contemporary Mathematics*.
- [The FrobeniusThresholds package for Macaulay2](#)
With Karl Schwede, Pedro Teixeira, and Emily E. Witt.
J. Softw. Algebra Geom. 11-1 (2021), 25–39.
- [Frobenius powers of some monomial ideals](#)
With Pedro Teixeira and Emily E. Witt
J. Pure Appl. Algebra 224 (2020), no. 1, 66–85.
- [Frobenius powers](#)
With Pedro Teixeira and Emily E. Witt
Math. Z. 296 (2020), no. 1-2 541–572
- [The TestIdeals package for Macaulay2](#)
With Alberto Boix, Mordechai Katzman, Zhibek Kadyrizova, Sara Malec, Marcus Robinson, Karl Schwede, Daniel Smolkin, Pedro Teixeira, and Emily E. Witt
J. Softw. Algebra Geom. 9 (2019), no. 2, 89–110.
- [Local Okounkov bodies and limits in prime characteristic](#)
With Jack Jeffries
Math. Ann. 372 (2018), no. 1-2, 139–178
- [Lyubeznik numbers and injective dimension in mixed characteristic](#)
With Luis Núñez Betancourt, Felipe Pérez, and Emily E. Witt
Trans. Amer. Math. Soc. 371 (2019), no. 11, 7533–7557
- [Cohomological dimension, Lyubeznik numbers, and connectedness in mixed characteristic](#)
With Luis Núñez Betancourt, Felipe Pérez, and Emily E. Witt
J. Algebra 514 (2018), 442–467
- [On the behavior of singularities at the \$F\$ -pure threshold](#)
With Eric Canton, Karl Schwede, and Emily E. Witt
Illinois J. Math. 60 (2016), no. 3-4, 669–685
- [Local \$\mathfrak{m}\$ -adic constancy of \$F\$ -pure thresholds and test ideals](#)
With Luis Núñez Betancourt and Emily E. Witt
Math. Proc. Cambridge Philos. Soc. 164 (2018), no. 2, 285–295
- [\$F\$ -threshold functions: Syzygy gap fractals and the two-variable homogeneous case](#)
With Pedro Teixeira
J. Symbolic Comput. 80 (2017), part 2, 451–483
- [\$F\$ -pure thresholds of homogeneous polynomials](#)
With Luis Núñez Betancourt, Emily E. Witt, and Wenliang Zhang
Michigan Math. J. 65 (2016), no. 1, 57–87.

RESEARCH ARTICLES (CONTINUED)

- [F-purity versus log canonicity for polynomials](#)
Nagoya Math. J. 224 (2016), no. 1, 10-36
- [F-invariants of diagonal hypersurfaces](#)
Proc. Amer. Math. Soc. 143 (2015), no. 1, 87-104
- [F-pure thresholds of binomial hypersurfaces](#)
Proc. Amer. Math. Soc. 142 (2014), no. 7, 2227-2242
- [F-purity of hypersurfaces](#)
Math. Res. Lett. 19 (2012), no. 2, 389-401
- [Log canonical thresholds, F-pure thresholds, and non-standard extensions](#)
With Bhargav Bhatt, Lance Miller, and Mircea Mustața
Algebra Number Theory 6 (2012), no. 7, 1459-1482

SOFTWARE DEVELOPMENT

[Macaulay2 \(M2\)](#) is a software system devoted to supporting research in algebraic geometry and commutative algebra. I am an active member of the M2 community, and participated in the 2014 MSRI, 2015 Boise, 2016 Salt Lake City, and 2017 Berkeley workshops. I also attended a smaller meeting in 2018 in Salt Lake City, and a M2 Coding Spring in 2019 at the IMA in Minneapolis.

I have co-authored the following packages for M2. These packages concern explicit computation in prime characteristic, and include implementations of some of the algorithms developed in my research papers, but also a lot more.

The M2 package `TestIdeals.m2`

[M2 Documentation](#) | [GitHub](#)

The M2 package `FrobeniusThresholds.m2`

[M2 Documentation](#) | [GitHub](#)

INVITED TALKS: LECTURE SERIES

- 2022 [BRIDGES Workshop](#)
University of Utah, Salt Lake City, UT
- 2017 [Escuela de Ontoño de Álgebra Conmutativa](#) (Fall School in Commutative Algebra)
Métodos en característica prima (Methods in prime characteristic)
Delivered in Spanish | CIMAT, Guanajuato, Mexico
- 2012 [Computational Workshop on Frobenius singularities and invariants](#)
Co-series with Karen E. Smith | University of Michigan, Ann Arbor, MI

INVITED TALKS: CONFERENCES

- 2021 Singularities in Positive Characteristic, CIRM, Luminy, France¹
- 2017 Local Cohomology in Commutative Algebra and Algebraic Geometry: A conference honoring Gennady Lyubeznik on the occasion of his 60th birthday | Minneapolis, MN
- 2017 [SACNAS](#) National Conference | Salt Lake City, UT
- 2017 [KUMUNU](#): A conference in commutative algebra and nearby fields | Lawrence, KS
- 2016 Commutative Algebra and its Interactions with Algebraic Geometry: Tight Closure, Linkage, and Syzygies. A conference honoring Craig Huneke on the occasion of his 65th birthday | Ann Arbor, MI
- 2015 Conference on D-modules in commutative algebra | CIMAT, Guanajuato, Mexico
- 2013 SIAM conference on Applied Algebraic Geometry | Fort Collins, CO
- 2012 [Math Alliance](#) Fifth Annual Field of Dreams Conference | Tempe, AZ

INVITED TALKS: SELECTED SEMINARS & WORKSHOPS & COLLOQUIA

- 2020 Fellowship of the Ring | MSRI¹
- 2019 Colloquium | University of Minnesota
- 2019 Colloquium | Texas A&M University
- 2017 Algebra Seminar | CIMAT, Guanajuato, Mexico
- 2017 Commutative Algebra Seminar | Georgia State University
- 2015 Commutative Algebra Seminar | University of Virginia
- 2015 Commutative Algebra Seminar | University of Michigan
- 2014 Colloquium | University of New Mexico
- 2014 Colloquium at KUMUNUjr | University of Nebraska
- 2014 Colloquium | University of Kansas
- 2013 Junior Member Seminar | MSRI
- 2011 AIM Workshop: Relating test ideals & multiplier ideals | Palo Alto, CA
- 2010 Algebraic Geometry Seminar | University of British Columbia

INVITED TALKS: AMS MEETINGS

- 2021 AMS Fall Central Sectional | Omaha, NE
- 2018 AMS Fall Central Sectional | Ann Arbor, MI
- 2016 AMS Spring Western Sectional Meeting | Salt Lake City, UT
- 2012 AMS Spring Central Section Meeting | Lawrence, KS
- 2011 AMS Fall Western Sectional Meeting | Salt Lake City, Utah
- 2011 AMS-MAA Joint Meeting | New Orleans, LA
- 2010 AMS Fall Eastern Sectional Meeting & Route 81 Conference | Syracuse, NY
- 2010 AMS-Sociedad Matemática Mexicana (SMM) Eighth International Meeting | Berkeley, CA

CONFERENCE ORGANIZATION

- 2016 KUMUNU 2016: A conference in commutative algebra and nearby fields
With Hailong Dao, Kan Katz, and Emily Witt | University of Kansas
- 2016 Special Session in honor of Karen Smith's AWM-AMS Noether Lecture
With Jack Jeffries and Karl Schwede | Seattle, WA
- 2014 – 2015 BIKES: a learning & mentoring seminar in commutative algebra
With Jack Jeffries and Emily E. Witt | University of Utah
- 2014 AMS Western Spring Sectional Meeting: Special Session in Commutative Algebra
With Karen E. Smith and Emily E. Witt | Albuquerque, New Mexico
- 2010 Frobenius Splittings in Commutative Algebra and Algebraic Geometry
Local Organizer | Ann Arbor, MI
- 2008 Conference in Honor of Mel Hochster
Local Organizer | Ann Arbor, MI

GRADUATE STUDENTS

- Ph.D. Trevor Arrigoni Currently in 4th year
- Ph.D. Christopher Wong Currently in 2nd year
- M.A. Grace McMonagle Completed degree in 2021

OUTREACH & UNDERGRADUATE ADVISING

- 2021 Michigan Math Circle Session Leader
- 2018 – Math Alliance [Facilitated Graduate Applications Process \(F-GAP\)](#)
As part of this program, I have assisted undergraduates from underrepresented groups prepare their applications for mathematics graduate school.
- 2017 – [Faculty Mentor for the Math Alliance](#)
- 2017 [2017 Cryptography and Number Theory Bootcamp REU](#)
This REU, co-directed with Emily Witt, was funded by NSF grant DMS #1501404 and hosted at the University of Texas at El Paso (UTEP) during the summer of 2017. As the name suggests, this was a fast-paced REU in which students learned and applied elementary number theory, algebra, and cryptography to design their own crypto-system. All 7 student participants were members of groups that are historically underrepresented in math.
- 2016 – [College of Liberal Arts & Sciences \(CLAS\) Faculty Mentor](#)
As part of this program, I mentor undergraduates at KU on academic probation.
- 2012 Undergraduate mentoring at the University of Minnesota
As a postdoc, I supervised a summer reading course on Modern Algebra for Mikal Nelson, as well as the Senior Projects of Taka Inukai and Duksang Yoon.
- 2011 REU at the University of Michigan
With Bhargav Bhatt and Emily E. Witt, I co-supervised an REU project on F -thresholds for Joseph Billian and Sifat Rahman, undergraduates at Michigan.
- 2008 – 2010 [Michigan Math and Science Scholars \(MMSS\)](#)
MMSS is a two-week summer program for talented high-school students interested in math and science. I co-taught *Fibonacci numbers*, a course on elementary number theory and algebra, with Mel Hochster and Emily E. Witt.
- 2008-2010 [M-STEM](#) / PTP Instructor
The M-STEM Academy, originally known as the Professionals in Training Program (PTP), provides training and mentoring to undergraduates at Michigan, and is aimed at increasing the participation of underrepresented groups in the areas of science and engineering. As a graduate student, I taught courses for incoming freshman to help them prepare for their first year.

GRADUATE COMMITTEES

- 2021 Masters Thesis Committee Chair
Grace McMonagle | University of Kansas
- 2019 Masters Thesis Committee Special Lecturer
Delio Jaramillo Velez | Guanajuato, Mexico
- 2019 Ph.D. Thesis Committee
Daniel Smolkin | University of Utah
- 2019 Ph.D. Comprehensive Exam Committee
Justin Lyle | University of Kansas KU.
- 2016 Oral Examination Committee
Daniel Smolkin | University of Utah
- 2016 Oral Examination Committee
Jennifer Kenkel | University of Utah

OTHER SERVICE

- Panelist for NSF and NSA
- Reviewer for NSA Mathematical Sciences Grant Program
- 2016 – KU Sustainability Center, Math Department Ambassador
- 2016 – KU Sustainability Center, Bicycle Advisory Committee
- 2016 Judge for KU Graduate Research Competition

TEACHING

University of Kansas

- 2022 Spring Algebraic Cryptography (601)
- 2021 Fall Linear Algebra (590)
- 2021 Spring Algebraic Differential Operators (831)
- 2020 Fall Elementary Linear Algebra (290)
- 2020 Spring Commutative Algebra (831)
- 2019 Fall Elementary Linear Algebra (290)
- 2019 Spring Intermediate Analysis (500)
- 2018 Fall Linear Algebra (590)
- 2018 Spring Modern Algebra (791)
- 2018 Spring Directed Reading: Topics in Algebra
- 2017 Fall Linear Algebra (590)
- 2017 Spring Introductory Modern Algebra (558)
- 2016 Fall Elementary Diff. Equations (320)
- 2016 Fall Directed Reading: Galois Theory
- 2016 Spring Introductory Modern Algebra (558)

Cornell University

- 2022 Fall Introduction to Analysis (3110)

University of Utah

- 2014 Spring Applied Complex Variables (3160)
- 2013 Fall Diff. Equations & Linear Algebra (2250)

University of Minnesota

- 2012 Spring Intro to Modern Algebra (4281)
- 2011 Fall Instructor & Coordinator for Diff. Equations & Linear Algebra (2242)

University of Michigan

- 2015 Fall Calculus 1 (115)
- 2011 Spring Calculus 1 (115)
- 2010 Spring Course Assistant for Algebraic Geometry (632)
- 2009 Fall Co-coordinator for Precalculus (105)
- 2007 Fall Calculus 1 (115)
- 2006 Fall Calculus 1 (115)