Contact Information:

e-mail: midff@math.uni-bonn.de

Website: https://mariainesdff.github.io

Academic Positions:

Universität Bonn, Postdoctoral Researcher, October 2024 – September 2028.

Universidad Autónoma de Madrid, Margarita Salas Researcher, February 2023 – September 2024.

Imperial College London, Research Associate in Formal Mathematics, August 2021 – February 2023.

ICMAT, Visitor, June – July 2021.

Universidad Nebrija, Assistant Professor, April – August 2021.

Education:

Ph.D. Mathematics, Boston University, USA, 2020.

M.A. Mathematics, Boston University, USA, 2018.

B.S. Mathematics, Universidad Autónoma de Madrid, Spain, 2014.

B.S. Computer Science, Universidad Autónoma de Madrid, Spain, 2014.

External Memberships:

Member of the Instituto de Ciencias Matemáticas (ICMAT), November 2023 – September 2024.

Research Fields:

Formal Mathematics, Number Theory, Arithmetic Geometry.

Awards and Honors:

Department Citation for Teaching Excellence: Boston University Department of Mathematics and Statistics, 2017.

Dean's Fellowship, Department of Mathematics and Statistics, Boston University, 2014-2015.

Mención Honorífica de la primera promoción del Doble Grado de Ingeniería Informática y Matemáticas (Honorific Mention of the first promotion of the Dual B.S. Degree in Computer Science and Mathematics).
I graduated at the top of my class, with a GPA of 9.48/10.

Beca de Excelencia, Comunidad de Madrid (Spain), 2013-2014.
Excellence scholarship awarded to the best undergraduate students (approximately those in the top 1%) in any university of the Community of Madrid. This award is exclusively based on academic performance during the previous academic year.

Beca de Excelencia, Comunidad de Madrid (Spain), 2012-2013.

Beca de Excelencia, Comunidad de Madrid (Spain), 2011-2012.

Beca de Excelencia, Comunidad de Madrid (Spain), 2010-2011.

Beca de Excelencia, Comunidad de Madrid (Spain), 2009-2010.

Premio Extraordinario de Bachillerato de la Comunidad de Madrid (Spain), 2009.
Award granted to the best high school senior students (top 0.1%) in the Community of Madrid.

Matrícula de Honor en Bachillerato, 2009.
Graduated with honors from high school.

Publications:

Formalizing polynomial laws and the universal divided power algebra, with Antoine Chambert-Loir. Accepted to Certified Programs and Proofs (CPP) 2026. Online abstract.

A blueprint for the formalization of Carleson's theorem on convergence of Fourier series, with Lars Becker, Leo Diedering, Floris van Doorn, Sébastien Gouëzel, Asgar Jamneshan, Evgenia Karunus, Edward van de Meent, Pietro Monticone, Jasper Mulder-Sohn, Jim Portegies, Joris Roos, Michael Rothgang, Rajula Srivastava, James Sundstrom, Jeremy Tan, and Christoph Thiele, 2025. Preprint. arXiv:2405.06423

A Formalization of Divided Powers in Lean, with Antoine Chambert-Loir. In Yannick Forster and Chantal Keller, editors, 16th International Conference on Interactive Theorem Proving (ITP 2025). Leibniz International Proceedings in Informatics (LIPIcs), Volume 352, pp. 4:1-4:17, Schloss Dagstuhl – Leibniz-Zentrum für Informatik (2025). https://doi.org/10.4230/LIPIcs.ITP.2025.4

A Formalization of Complete Discrete Valuation Rings and Local Fields, with Filippo Alberto Edoardo Nuccio Mortarino Majno di Capriglio. In Amin Timany and Dmitriy Traytel, editors, Proceedings of the 13th ACM SIGPLAN International Conference on Certified Programs and Proofs (CPP 2024). Association for Computing Machinery, New York, NY, USA, 190–204. doi:10.1145/3636501.3636942

The refined class number formula for Drinfeld modules, with Daniel Macías Castillo and Daniel Martínez Marqués, 2023. Submitted. arXiv:2309.17256.

Formalizing Norm Extensions and Applications to Number Theory, In Adam Naumowicz and René Thiemann, editors, 14th International Conference on Interactive Theorem Proving (ITP 2023), volume 268 of Leibniz International Proceedings in Informatics (LIPIcs), pages 13:1–13:18, Dagstuhl, Germany, 2023. doi:10.4230/LIPIcs.ITP.2023.13.

Moduli spaces of shtukas over the projective line. Journal de Théorie des Nombres de Bordeaux, Volume 34 (2022) no. 2, pp. 393–418. doi:10.5802/jtnb.1207.

Formalizing the Ring of Adèles of a Global Field, In June Andronick and Leonardo de Moura, editors, 13th International Conference on Interactive Theorem Proving (ITP 2022), volume 237 of Leibniz International Proceedings in Informatics (LIPIcs), pages 14:1–14:18, Dagstuhl, Germany, 2022. doi:10.4230/LIPIcs.ITP.2022.14.

Computing rational points on rank 0 genus 3 hyperelliptic curves, with Sachi Hashimoto. In: Balakrishnan, J.S., Elkies, N., Hassett, B., Poonen, B., Sutherland, A.V., Voight, J. (eds) *Arithmetic Geometry, Number Theory, and Computation*, Simons Symposia. Springer, Cham. (2021), pp. 449–460. doi:10.1007/978-3-030-80914-0_14

Rational linear subspaces of hypersurfaces over finite fields, with Sumita Garai, Kelly Isham, Takumi Murayama and Geoffrey Smith, 2021. arXiv:2111.10976

Modularity of elliptic curves defined over function fields, Boston University PhD dissertation, May 2020. Available at https://open.bu.edu/handle/2144/41489. Advisor: Jared Weinstein.

Seminar and Conference Talks:

(Upcoming) Arithmetische und Algebraische Geometrie Seminar, Munich, January 28, 2026.

(Upcoming) Institute for Mathematics Colloquium, Universität Potsdam, December 17, 2025.

(Upcoming) Graduate Colloquium, Universität Bonn, November 26, 2025.

CMSA New Technologies in Mathematics, Harvard University, October 22, 2025.

Sixteenth Conference on Interactive Theorem Proving, Reykjavik University, October 1st, 2025.

MATRIX-MFO Tandem Workshop: Machine Learning and AI for Mathematics, Oberwolfach, September 26, 2025.

Dynamics and Analysis in Interaction, Royal Spanish Academy of Sciences, September 4, 2025 (Plenary lecture).

Rational Points 2025, Schney, July 29, 2025.

Big proof: formalizing mathematics at scale, Isaac Newton Institute, June 10, 2025.

Proofs: from Euclides to AI, Royal Netherlands Academy of Arts and Sciences (KNAW), May 22, 2025,

AI for Mathematics and Theoretical Computer Science, Simons Institute for the Theory of Computing, April 7, 2025.

MPI-Oberseminar, Max Planck Institute for Mathematics, January 30, 2025.

Informal Formalization Seminar, Vrije Universiteit Amsterdam, January 24, 2025.

RSME's Congress of Young Researchers, University of the Basque Country, January 16, 2025 (Plenary lecture).

Women in Algebra and Symbolic Computation III, Bad Dürkheim, December 10, 2024.

Number Theory Lunch Seminar, Max Planck Institute for Mathematics, November 20, 2024.

Formalisation of Mathematics with Interactive Theorem Provers, University of Cambridge, November 14, 2024.

Research Seminar on Formal Mathematics, Heidelberg University, October 22, 2024.

AMS–UMI Joint Meeting, Università degli Studi di Palermo, July 24, 2024.

CRM Exploratory Workshop, Centre de Recerca Matemàtica, July 15, 2024.

Women in EuroProofNet 2024, Hausdorff Institute of Mathematics, July 6, 2024.

VaNTAGe math seminar, Online, April 16, 2024.

Seminario del Departamento de Matemáticas, Universidad Autónoma de Madrid, March 14, 2024.

Summer Workshop in Mathematics, Universidade de Brasília (Online), February 8, 2024.

Congreso Bienal de la Real Sociedad Matemática Española, Universidad Pública de Navarra, January 23, 2024.

13th ACM SIGPLAN International Conference on Certified Programs and Proofs, London, January 15, 2024.

Lean Together 2024, Online, January 12, 2024.

Seminario de Álgebra, Universidad de Sevilla, December 1st, 2023.

Seminario de Otoño, IMUS, Sevilla, December 1st, 2023.

Lean for the Curious Mathematician 2023, Düsseldorf, September 7, 2023.

Lean for the Curious Mathematician 2023, Düsseldorf, September 5, 2023.

Fourteenth Conference on Interactive Theorem Proving, Białystok, August 2, 2023.

Machine-Checked Mathematics, Lorentz Center, July 12, 2023 (Keynote lecture).

Formalization of Cohomology Theories, BIRS, May 23, 2023.

Lean in Lyon 2023, Université de Lyon, April 17, 2023.

Conferencias 14M: Día Internacional de las Matemáticas, Facultad de Matemáticas, Universidad Complutense de Madrid, March 14, 2023 (Plenary lecture).

Machine Assisted Proofs, IPAM, UCLA, February 16, 2023.

Conferencias de Posgrado, Facultad de Informática, Universidad Complutense de Madrid, November 8, 2022.

Thirteenth Conference on Interactive Theorem Proving, Haifa, August 9, 2022.

Lean for the Curious Mathematician 2022, ICERM, July 14, 2022.

Novenas Jornadas de Teoría de Números, Universidad de La Rioja, June 29, 2022.

London Learning Lean, Imperial College London, June 16, 2022.

Women in Number Theory and Geometry, Norfolk, June 7, 2022.

London Number Theory Seminar, University College London, March 9, 2022.

London Learning Lean, Imperial College London, January 13, 2022.

Seminario de Álgebra, Geometría y Topología, Universidad Complutense de Madrid, January 14, 2020.

Seminario de Teoría de Números, Universidad Autónoma de Madrid – ICMAT, January 10, 2020.

Junior Number Theory Days, Johns Hopkins University, December 7, 2019.

Algebra seminar, University of Connecticut, November 6, 2019.

Number Theory seminar, Stanford University, November 4, 2019.

Number Theory seminar, Boston University, October 28, 2019.

Grants:

Cecilia Tanner Research Impulse Grant, Department of Mathematics, Imperial College London (2022).

Margarita Salas Postdoctoral Grant (CA1/RSUE/2021-00623), granted by the Spanish Ministry of Universities.

Participation in Research Projects:

Symmetries and Invariants in Geometry and Arithmetic (PID2022-142024NB-I00) Principal Investigators: José Ignacio Burgos Gil and Daniel Macías Castillo. Funded by the Ministry of Science and Innovation, Spain, 2023–2027.

Digitising the Langlands Program (EPSRC Grant EP/V048724/1). Principal Investigator: Kevin Buzzard. Funded by EPSRC, UK 2021–2023.

Perfectoid Spaces, Diamonds, and the Langlands Program (NSF Award 1902148). Principal Investigator: Jared Weinstein. Funded by the National Science Foundation (NSF), USA. 2019–2020.

Research Stays:

Invited Professor at Institut Camille Jordan, Université Jean Monnet.
June 29 – July 12, 2025, Saint-Étienne, France.

Invited Professor at Institut Camille Jordan, Université Jean Monnet.
March 20 – April 3, 2025, Saint-Étienne, France.

Prospects of Formal Mathematics Trimester Program at the Hausdorff Research Institute for Mathematics.
June 2 – July 5, 2024, Bonn, Germany.

Invited Professor at Institut Camille Jordan, Université Jean Monnet.
June 6 – 21, 2023, Saint-Étienne, France.

Invited Professor at Institut Camille Jordan, Université Jean Monnet.
April 12 – 27, 2023, Saint-Étienne, France.

Conference Organization:

(Upcoming) Future-proofing formal mathematics (Research Semester Programme).
Fall 2027. Centrum Wiskunde & Informatica (CWI), Amsterdam, The Netherlands.

(Upcoming) Lean Workshop (FLoC 2026).
July 24/25, 2026 (TBC). ISCTE, Lisbon, Portugal.

AI for Mathematics and Theoretical Computer Science.
April 7 – 11, 2025. Simons Institute for the Theory of Computing and SLMath, Berkeley, California, USA.

10as JTN: Décimas Jornadas de Teoría de Números.
July 8 – 12, 2024, Madrid, Spain.

Formalisation of Mathematics: Workshop for Women and Mathematicians of Minority Gender.
May 27 – 31, 2024. International Centre for Mathematical Sciences (ICMS), Edinburgh, United Kingdom.
Lead organizer.

Lean for the Curious Mathematician 2024.
March 25 – 29, 2024. Centre international de rencontres mathématiques (CIRM), Luminy, France.

Conferences Attended:

(Upcoming) Women in Numbers 7.
June 14 – 19, 2026, BIRS, Banff, Canada.
Project leader.

ITP 2025: Sixteenth Conference on Interactive Theorem Proving.
September 28 – October 1, 2025, Reykjavik, Iceland.

MATRIX-MFO Tandem Workshop: Machine Learning and AI for Mathematics.
September 21 – 16, 2025, Oberwolfach, Germany.
By invitation only.

Dynamics and Analysis in Interaction.
September 1 – 5, 2025, Madrid, Spain.
Invited plenary speaker.

Rational Points 2025.
July 27 – August 2, 2025, Schney, Germany.
Invited speaker.

Magma Meeting: Rational Points 2025.
July 25 – 26, 2025, Würzburg, Germany.

Big proof: formalizing mathematics at scale.
June 9 – 13, 2025, Cambridge, UK.
Invited speaker.

Proofs: from Euclides to AI.
May 22, 2025, Amsterdam, The Netherlands.
Invited speaker.

AI for Mathematics and Theoretical Computer Science.
April 7 – 11, 2025. Simons Institute for the Theory of Computing and SLMath, Berkeley, California, USA.

RSME's Congress of Young Researchers.
January 13 – 17, 2025, University of the Basque Country, Bilbao, Spain.
Invited plenary speaker.

Women in Algebra and Symbolic Computation III.
December 9 – 11, 2024, Kurpark-Hotel, Bad Dürkheim, Germany.
Invited speaker.

AMS–UMI Joint Meeting
July 23 – 26, 2024, Università degli Studi di Palermo, Italy.
Invited speaker at the special session 'Arithmetic and Geometric Aspects of Drinfeld Modules, Anderson Motives, and Computational Aspects'.

CRM Exploratory Workshop.
July 15, 2024. Centre de Recerca Matemàtica, Barcelona, Spain.
Invited speaker.

10ᵃˢ JTN: Décimas Jornadas de Teoría de Números.
July 8 – 12, 2024, Madrid, Spain.

Women in Formal Mathematics 2024.
July 6 – 7, 2024. Hausdorff Institute of Mathematics, Bonn, Germany.

Women in EuroProofNet 2024.
July 6, 2024. Hausdorff Institute of Mathematics, Bonn, Germany.
Invited speaker.

Formalising algebraic geometry.
June 24 – 28, 2024. AIM, California, USA. (Online workshop).
By invitation only.

Formalisation of Mathematics: Workshop for Women and Mathematicians of Minority Gender.
May 27 – 31, 2024. ICMS, Edinburgh, United Kingdom.
Lead organizer and project leader.

Lean for the Curious Mathematician 2024.
March 25 – 29, 2024. CIRM, Luminy, France.
Co-organizer and project leader.

Congreso Bienal de la Real Sociedad Matemática Española.
January 22 – 26, 2024, Pamplona, Spain.
Invited speaker at the Number Theory special session.

CPP 2024 : 13th ACM SIGPLAN International Conference on Certified Programs and Proofs.
January 15 – 16, 2024, London, UK.

Lean Together 2024.
January 9 – 12, 2024, Virtual.
Invited speaker.

Lean for the Curious Mathematician 2023.
September 4 – 8, 2023, Düsseldorf, Germany.
Invited as project leader/lecturer.

ITP 2023: Fourteenth Conference on Interactive Theorem Proving.
July 31 – August 4, 2023, Białystok, Poland.

Machine-Checked Mathematics.
July 10–14, 2023, Lorentz Center, Leiden, The Netherlands.
Invited keynote speaker and project leader.

Formalization of Cohomology Theories.
May 21 – 26, 2023, BIRS Juniper, Banff, Canada.
By invitation only.

Machine Assisted Proofs.
February 13–17, 2023, IPAM, UCLA, Los Angeles, USA.
Invited speaker.

Global Young Scientists Summit (GYSS) 2023.
January 17 – 20, 2023, Singapore.

2022 Xena Summer Workshop.
September 26 – 30, 2022, Imperial College London, London, UK.
Invited as project leader.

ITP 2022: Thirteenth Conference on Interactive Theorem Proving.
August 7 – 10, 2022, Haifa, Israel.

Lean for the Curious Mathematician 2022.
July 11 – 15, 2022, ICERM, Providence, USA.
Invited as group leader/lecturer.

9as JTN: Novenas Jornadas de Teoría de Números.
June 28 – July 1, 2022, Universidad de La Rioja, Logroño, Spain.

WINGs 2022: Women in Number Theory and Geometry.
June 6 – 8, 2022, West Lexham, Norfolk, UK.

LMS Women in Mathematics Day.
May 11, 2022, University of Reading, Reading, UK (virtual attendee).

Lean in Lyon.
May 10, 2022, Université Claude Bernard Lyon, Lyon, France (virtual attendee).

Learning Mathematics with LEAN.
April 6, 2022, Loughborough University, Loughborough, UK (virtual attendee).

Arizona Winter School 2020: Nonabelian Chabauty.
March 7 – 11, 2020, University of Arizona, Tucson, USA.

Junior Number Theory Days 2019.
December 7 – 8, 2019, Johns Hopkins University, Baltimore , USA.
Invited speaker.

Boston University/Keio University workshop 2019.
June 24 – 28, 2019, Boston University, Boston, USA.

MRC: Explicit Methods in Arithmetic Geometry in Characteristic p.
June 16 – 22, 2019, Whispering Pines, Rhode Island, USA.

Geometrization of the local Langlands program.
May 6 – 10, 2019, McGill University, Montréal, Canada.

Arizona Winter School 2019: Topology and Arithmetic.
March 2 – 6, 2019, University of Arizona, Tucson, USA.

Boston University Data Science Day 2019.
February 6, 2019, Boston University, Boston, USA.

Mathematics is a long conversation: a celebration of Barry Mazur.
June 4 – 8, 2018, Harvard University, Cambridge, USA.

CTNT 2018 Conference (Connecticut Summer School in Number Theory).
June 1 – 3, 2018, University of Connecticut, Storrs, USA.

Women and Mathematics 2018: Mathematics of Modern Cryptography.
May 19 – 25, 2018, Institute for Advanced Study, Princeton, USA.

Strength in Numbers: A Graduate Workshop in Number Theory and Related Areas.
May 11 – 12, 2018, Queen's University, Kingston, Canada.

Arithmetic of Algebraic Curves.
April 6 – 8, 2018, University of Wisconsin, Madison, USA.

Arizona Winter School 2018: Iwasawa Theory.
March 3 – 7, 2018, University of Arizona, Tucson, USA.

Graduate Workshop in Algebraic Geometry (GWAGWMMG).
February 16 – 18, 2018, Harvard University and MIT, Cambridge, USA.

MSRI Summer School: Automorphic Forms and the Langlands Program.
July 24 – August 4, 2017, MSRI, Berkeley, California, USA.

Arizona Winter School 2017: Perfectoid Spaces.
March 11 – 15, 2017, University of Arizona, Tucson, USA.

Rubinfest: L-functions and Arithmetic.
June 13 – 16, 2016, Harvard University, Cambridge, USA.

Teaching:

Instructor at Universidad Autónoma de Madrid

- Minicourse on Mathematical Formalization with Lean (April 4 – 5, 2024).

- Coding Theory and Cryptography (Fall 2023).

Invited Lecturer at the Sixth EACA International School on Computer Algebra and its Applications

- Formalizing Mathematics in Lean (Santiago de Compostela, July 18 – 21, 2023).

Invited Lecturer at Universidad Complutense de Madrid's PhD Program in Mathematical Research

- Formalizing Mathematics in Lean (Formalización de matemáticas en Lean), PhD Course (February–March 2023).

Assistant Professor at Universidad Nebrija

- Calculus II (Spring 2021).

- Mathematics II (Spring 2021).

Summer School Instructor at Boston University

- MA 226: Differential Equations (Summer I 2019).

- MA 142: Introduction to Linear Algebra (Summer I 2017).

- MA 242: Linear Algebra (Summer I 2016).

- MA 121: Calculus for the Life and Social Sciences I (Summer I 2015).

Teaching Assistant at Boston University

- MA 225: Multivariate Calculus (Spring 2019).

- MA 123: Calculus I (Fall 2018).

- MA 225: Multivariate Calculus (Spring 2018).

- MA 123: Calculus I (Fall 2017).

- MA 113: Elementary Statistics (Spring 2017).

- MA 411: Advanced Calculus (Fall 2016).

- MA 225: Multivariate Calculus (Spring 2016).

    – MA 569: Optimization Methods of Operations Research (Fall 2015).

Counselor in PROMYS for Teachers (Summer II 2019, Summer II 2018, Summer II 2016, Summer II 2015).

Academic Service:

(Upcoming) Program committee member for the 17th Conference on Interactive Theorem Proving (ITP 2026).

Program committee member for the 18th Conference on Intelligent Computer Mathematics (CICM 2025).

Program committee member for the 16th Conference on Interactive Theorem Proving (ITP 2025).

Referee for the 'Annals of Formalized Mathematics' journal.

2024 – present: Reviewer for Lean's mathematical library Mathlib.

Panel discussion on research careers, V UAM Formative Days, February 10, 2024.

Doctorate committee member, Anne Baanen, Vrije Universiteit Amsterdam, January 29, 2024.

Spring 2019: Boston University Number Theory Expository Seminar, topic: Tools for Fermat's Last Theorem. Organizer, Boston University.

Fall 2018: Boston University Number Theory Expository Seminar, topics: Supersingular Isogeny Graphs; Shimura Varieties. Organizer, Boston University.

Languages:

English: Fluent in spoken and written English.

Spanish: Native language.

French: Intermediate level. Able to understand mathematical literature.

Computer Skills:

Mathematical software: Lean, SAGE, Magma, Matlab.

Programming languages:

    – Proficient with Lean, Python, C, Java.
    – Some experience with Lisp, R, VHDL, Javascript, HTML, XML, CSS.

Databases: SQL.

Last modified on November 14$^{\text{th}}$, 2025.