

MICHAEL RUDDY

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Data Institute ♦ University of San Francisco

101 Howard St. Suite 500, San Francisco, CA 94105

POSITIONS

Assistant Professor

University of San Francisco, MS in Data Science Program

August 2021 - Current

San Francisco, CA

Postdoctoral Fellow

University of San Francisco, Data Institute

September 2020 - August 2021

San Francisco, CA

Postdoctoral Researcher

Max Planck Institute for Mathematics in the Sciences (MPI MiS)

August 2019 - August 2020

Leipzig, Germany

EDUCATION

Ph.D. in Mathematics

North Carolina State University

Advisors: Dr. Irina Kogan, Dr. Cynthia Vinzant

May 2019

Raleigh, NC

M.S. in Mathematics

North Carolina State University

December 2016

Raleigh, NC

B.S. in Mathematics

University of Tennessee at Martin

Minor in Physics

May 2014

Martin, TN

HONORS AND AWARDS

- Winton-Rose Award for Excellence in Graduate Research April 2019
- ICERM Travel and Housing Scholarship Fall 2018
- Maltbie Award for Excellence in Graduate Teaching May 2018
- Meeting on Applied Algebraic Geometry Conference Travel Scholarship April 2018, 2019
- NSF PRODUCT Travel Scholarship June 2017
- Preparing the Profesoriade Stipend August 2016
- Recognition for Excellence in Classroom Teaching March 2016
- Louise Knifely Annual Mathematics Scholarship Award 2012, 2013

PUBLICATIONS

The moving frame method for iterated-integrals: orthogonal invariants with Joscha Diehl, Rosa Preiss, and Nikolas Tapia.* *To appear in Foundations of Computational Mathematics*, preprint available at arXiv:2012.05880.

Signatures of algebraic curves via numerical algebraic geometry with Tim Duff.* *To appear in Journal of Symbolic Computation*, preprint available at arXiv:2005.04783.

Numerical equality tests for rational maps and signatures of curves with Tim Duff.* *Proc. of the 45th ISSAC* (2020), pp. 154-161.

Maximum likelihood degree of the two-dimensional linear Gaussian covariance model with Jane Ivy Coons and Orlando Marigliano.* *Algebraic Statistics*. **11** (2020), no. 2, pp. 107-123.

Differential signatures of algebraic curves with Irina A. Kogan and Cynthia Vinzant.* *SIAM J. Appl. Algebra Geometry*. **4** (2020), no. 1, pp. 185-226.

The classification and curvature of biquotients of the form $Sp(3)//Sp(1)^2$ with Jason DeVito, Robert DeYeso III, and Philip Wesner.* *Annals of Global Analysis and Geometry*. **46** (2014), no. 4, pp. 389-407.

Existence of positive periodic solutions for higher order singular difference equations with Jacob Johnson, Lingju Kong, and Alexander Ruys de Perez.* *Electronic Journal of Qualitative Theory Differential Equations* (2014), No. 3, pp. 1-8

IN PREPARATION

Multitask approach for using deep learning to directly predict dose-volume histogram values for multiple radiation delivery technologies Michael Ruddy, Benjamin Ziemer, Gilmer Valdes, and Yannet Interian (Expected Spring 2022).

Rational partition models under iterative proportional scaling with Jane Coons and Carlotta Langer* (Expected Spring 2022).

* indicates authors are credited in alphabetical order.

TEACHING EXPERIENCE

University of San Francisco

Instructor of Record: Create syllabi, develop and give lectures/in-class activities, write and grade exams, hold office hours, determine final grades. Occasionally grade or manage other teaching assistants.

- Introduction to Statistical Modeling Spring 2022
- Communications for Analytics Fall 2021
- Deep Learning Neural Networks with PyTorch Summer 2021
- Introduction to Data Science in R Spring 2021

Practicum Mentor: Serve as mentor for Data Science MS students as they work on practicum projects with USF's industry and medical partners, which includes advising students on technical material, providing guidance on professionalism, and helping students with job applications/interviews.

- Risk analysis and customer acquisition modeling with Metromile, 2 students 2021-2022
- Data analysis and modeling with nonprofits including the ACLU, 5 students 2021-2022
- Multiple deep learning projects with imaging data with UCSF Oncology, 5 students 2020-2022
- Artificial cornea imaging tasks and NLP data extraction with W.L. Gore, 3 students 2020-2021

North Carolina State University

Instructor of Record:

- Calculus II Honors Spring 2018
- Calculus II Fall 2017
- Foundations of Euclidean Geometry Spring 2017
- Calculus for Life and Management Sciences A Fall 2016
- Calculus for Life and Management Sciences B Spring 2016
- Calculus I Fall 2015

Recitation Leader: Grade exams and conduct small recitation sections.

- Calculus for Life and Management Sciences A Spring 2015

Lecture Assistant: Grade exams and take attendance.

- Calculus II Fall 2014

RESEARCH ACTIVITIES

Quality and Productivity Research Conference, *San Francisco State University* June 2022
Co-organizer for the QPRC bringing together researchers from academia, industry, and government on topics related to Quality, Productivity, and Fairness in AI.

Group Actions, Invariants, and Applications at SIAM-AG21, *Texas A&M* August 2021
Co-organizer with Irina Kogan of a mini-symposium at the upcoming SIAM Conference on Applied Algebraic Geometry (SIAM-AG21).

Geometry of curves in time series and shape analysis, *MPI MiS* August 2020
Co-organizer with Joscha Diehl and Max von Renesse of an online workshop designed to showcase recent applications of geometric tools to data science.

Algebraic Vision Research Cluster at ICERM, *Brown University* February 2019
Workshop designed to foster collaboration between the nonlinear algebra and computer vision communities at the Institute for Computational and Experimental Research in Mathematics (ICERM).

Graduate Participant at ICERM, *Brown University* Fall 2018
Semester program on Nonlinear Algebra at ICERM.

CONFERENCE PRESENTATIONS

Rigid-Motion Invariants of Curves Through Iterated-Integrals
Presentation

- Workshop on Moving Frames and their Modern Applications, *BIRS* November 2021
- SIAM Conference on Applied Algebraic Geometry, *Texas A&M* August 2021

Signatures of Algebraic Curves
Poster

- Nonlinear Algebra in Applications Workshop, *ICERM* November 2018
- Real Algebraic Geometry and Optimization Workshop, *ICERM* October 2018
- Meeting on Applied Algebraic Geometry, *Georgia Tech University* April 2018, 2019

Presentation
• AMS Fall Central Sectional Meeting - Special Session, *University of Michigan, Ann Arbor* October 2018

Foundations of Euclidean Geometry
Poster

- Geometry for Secondary Teachers Conference, *University of Michigan, Ann Arbor* June 2018

SEMINAR TALKS

Geometry for Political Gain: How to Spot a Gerrymander
Presentation

- Spotlight Saxony Series, *Democrats Abroad, Saxony* June 2021
- Politics 101 Series, *Democrats Abroad, Frankfurt* October 2021

An Introduction to Deep Learning for Image Analysis
Presentation

- Seminar Series in Data Science, *University of San Francisco* November 2020

Equivalence classes of planar algebraic curves through numerical algebraic geometry

Presentation

- Nonlinear Algebra Seminar Online, *MPI MiS*

April 2020

Signatures of Algebraic Curves

Presentation

- Mathematics and Information Seminar, *Universität Greifswald*
- Differential Geometry and Symplectic Topology Seminar, *University of Minnesota*
- Summer Seminar, *MPI MiS*

December 2019

November 2019

July 2019

What is Inquiry-Based Learning?

Presentation

- Graduate Instructor Support and Tools Seminar, *NC State*

February 2018

PROFESSIONAL DEVELOPMENT

Macaulay2 Workshop, *Universität des Saarlandes, Saarbrücken*

September 2019

Geometry for Secondary Teachers Conference, *University of Michigan, Ann Arbor*

June 2018

Applications of Polynomial Systems, *Texas Christian University*

June 2018

The Geometry of Redistricting Workshop, Educator Track, *Duke University*

November 2017

Inquiry Based Learning Workshop, *Cal Poly, San Luis Obispo*

June 2017

Preparing the Professoriate, *NC State*

Fall 2016 - Spring 2017

SERVICE AND OUTREACH

AI4ALL, *Mentor, Panel Member*

Fall 2021, Spring 2022

Served as mentor for an AI4ALL Changemaker high school student interested in AI, advising them on their career path and on creating an exceptional resume. Served on a panel to discuss careers in AI and my own personal journey in this space.

Cientifico Latino Graduate Student Mentorship Initiative, *Mentor*

Fall 2021 - Spring 2022

This mission of this program is to help underrepresented graduate school applicants by providing them one-on-one guidance through the process. I was paired with a student, who I meet with regularly to help devise an application strategy, revise materials, and give general advice.

Geometry for Teachers Task Repository Project, *Participant*

Fall 2018 - Spring 2019

Assist with the Task Repository Project organized by the Geometry, Reasoning, and Instructional Practices group at University of Michigan, which involves organizing materials for geometry courses for future secondary teachers.

Graduate Instructor Support and Tools, *Committee Member*

Summer 2018 - Spring 2019

Help maintain the Teaching Assistant Wiki and organize workshops and seminars centered around graduate instruction at NC State. Helped organize a summer seminar for graduate students at NC State to discuss teaching-related topics and collaborate on course development, led several workshops for the seminar.

SUM Series, *Organizational Assistant*

Fall 2017 - Spring 2018

Maintain website, student mailing list and publicize talks for undergraduate mathematics lecture series at NC State.

Math Doesn't Bug Me!, *Volunteer*

2015-2018

Conduct mathematical games with grade school children at North Carolina Museum of Science's "BugFest," (2015, 2016, 2017) and at NC State College of Science's "State of the Sciences" (2016, 2018).