

# MICHAEL RUDDY

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## POSITIONS

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<b>Senior Data Scientist</b> <i>Qventus, Inc.</i>	March 2022 - Current <i>Mountain View, CA</i>
<b>Assistant Professor</b> <i>University of San Francisco, MS in Data Science Program</i>	August 2021 - March 2022 <i>San Francisco, CA</i>
<b>Postdoctoral Fellow</b> <i>University of San Francisco, Data Institute</i>	September 2020 - August 2021 <i>San Francisco, CA</i>
<b>Postdoctoral Researcher</b> <i>Max Planck Institute for Mathematics in the Sciences (MPI MiS)</i>	August 2019 - August 2020 <i>Leipzig, Germany</i>

## EDUCATION

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<b>Ph.D. in Mathematics</b> <i>North Carolina State University</i> Advisors: Dr. Irina Kogan, Dr. Cynthia Vinzant	May 2019 <i>Raleigh, NC</i>
<b>M.S. in Mathematics</b> <i>North Carolina State University</i>	December 2016 <i>Raleigh, NC</i>
<b>B.S. in Mathematics</b> <i>University of Tennessee at Martin</i> Minor in Physics	May 2014 <i>Martin, TN</i>

## HONORS AND AWARDS

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· 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 Profesorate Stipend	August 2016
· Recognition for Excellence in Classroom Teaching	March 2016
· Louise Knifely Annual Mathematics Scholarship Award	2012, 2013

## PUBLICATIONS

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*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

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*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

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### 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.

- Deep Learning Neural Networks with PyTorch Summer 2021, 2022
- Introduction to Statistical Modeling Spring 2022
- Communications for Analytics Fall 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

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- 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 Resarch 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

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### **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

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### **Geometry for Political Gain: How to Spot a Gerrymander**

*Presentation*

- Politics 101 Series, *Democrats Abroad, Frankfurt* October 2021
- Spotlight Saxony Series, *Democrats Abroad, Saxony* June 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* December 2019
- Differential Geometry and Symplectic Topology Seminar, *University of Minnesota* November 2019
- Summer Seminar, *MPI MiS* July 2019

## What is Inquiry-Based Learning?

*Presentation*

- Graduate Instructor Support and Tools Seminar, *NC State* February 2018

## PROFESSIONAL DEVELOPMENT

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- Macaulay2 Workshop**, *Universität des Saarlandes, Saabrücken* 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

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**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).