Tracey Oellerich

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Education

Ph.D, *Mathematics* **George Mason University** Fairfax, VA — expected July 2024

MS, *Mathematics* **George Mason University** Fairfax, VA — August 2019

BS, *Mathematics*
BA, *Physics*
Wilkes University Wilkes-Barre, PA — May 2016

- **Minors:** Statistics, Secondary Education

Research Interests

Mathematical Biology, Data Science, Numerical Methods, Network Analysis, Dynamical Systems, Machine Learning, Modeling of Nonlinear Systems, Optimization

Research

George Mason University, Ph.D Candidate — Aug. 2019 to *present*
Department of Mathematical Sciences

- Network Analysis of Biological Systems: Adaptation and Inferring Dynamics
  Advisor: Dr. M. Emelianenko, Department of Mathematical Sciences, GMU

National Institutes of Health (NIH), Graduate Data Science Intern — June 2021 to Aug. 2021
National Center for Advancing Translational Sciences (NCATS)

- Deep Learning on Embedded Protein-Protein Interaction Networks to Prioritize Disease Targets
  Mentor: Dr. V. Siramshetty, NCATS

Wilkes University, Undergraduate Researcher — Aug 2014 to May 2016

- Enhanced Protein Folding through Confinement Inside a Hydrophilic Nanopore
  Advisor: Dr. D. Lucent, Department of Physics, Wilkes University
- Squaring the Circle using Hyperbolic Geometry
  Advisor: Dr. L. Berard, Department of Mathematics, Wilkes University
- Stern's Diatomic Sequence (Joint with E. Klemchak)
  Advisor: Dr. R. Pryor, Department of Mathematics, Wilkes University

Publications

(1) **T. Oellerich** and M. Emelianenko. "Towards Robust Data-Driven Automated Recovery of Symbolic Conservation Laws from Limited Data". *Submitted*. arXiv:2403.04889v1

(2) **T. Oellerich**, M. Emelianenko, L. A. Liotta, and R. P. Araujo. "Biological Networks with Singular Jacobians: Their Origins and Adaptation Criteria". *In Preparation*. bioRxiv 2021.03.01.433197

(3) **T. Oellerich**, M. Emelianenko, M. Pierobon, and E. Baldelli. "Utilizing Non-negative Least Squares to Learn biological Network Dynamics". *In Preparation*.

(4) B. Thapa, I. Mazin, P. Suryanarayana, M. Emelianenko, and **T. Oellerich**. "Devising Momentum-Space Orbital-Free Density Functionals using Machine Learning". *In Preparation*.

Honors and Awards

- Mathematics Graduate Research Excellence Award, *GMU* — May 2023
- T.C. Lim Graduate Award for Excellence in Teaching, *GMU* — May 2017
- One of 15 students selected to participate in the Graduate Data Science Summer Program(GDSSP), *National Institutes of Health (NIH), Bethesda, MD* — June 2021 - Aug. 2021
- One of 200 students selected worldwide to attend the 9th Heidelberg Laureate Forum, *Heidelberg, Germany* — Sept. 18-23, 2022
- Finalist in George Mason University's 3MT® (Three-Minute Thesis) Competition, *GMU* — April 8, 2022
- Frederick E. Bellas Award for Outstanding Physics Student, *Wilkes University* — May 2016
- James DeCosmo Award in Mathematics, *Wilkes University* — May 2016
- College of Science and Engineering Outstanding Student Award, *Wilkes University* — May 2016

Advanced Coursework and Programming Languages

BIOL 575: Bench to Bedside: Translational Molecular Research (*Padua, Italy*), **BINF 760**: Machine Learning for Bio-informatics, **CSI 786**: Molecular Dynamics, **MATH 689**: Bifurcation Theory, **MATH 689**: Computational Learning and Discovery, **MATH 689**: Deep Learning and Optimization with PDEs, **MATH 689**: Differential Equations and UQ in Data Science, **MATH 689**: Dynamics and Stability of Nonlinear Waves, **MATH 689**: Topics in Mathematics of Data Science, **MATH 781**: Advanced Topics in Applied Math.

Programming Languages: Matlab, Python, Mathematica, R

Research Program Participation

- Graduate Data Science Summer Program(GDSSP), *National Institutes of Health (NIH), Bethesda, MD* — June 2021 - Aug. 2021
- MSRI Summer Graduate School Algebraic Methods for Biochemical Reaction Networks, *Max Planck Institute for Mathematics in the Sciences (MPI), Leipzig, Germany* — June 12-23, 2023
- American Mathematical Society's Mathematics Research Community (MRC) on Models and Methods for Sparse (Hyper)Network Science, *Java Center, NY* — June 5 – 11, 2022
- Fields-CQAM Industrial Problem Solving Workshop (IPSW), *The Fields Institute for Research in Mathematical Sciences, Toronto, Ontario* — May 6 - 10, 2019
- Equity in Education Data-thon, *Library of Virginia, Richmond, VA* — Oct. 3-4, 2019

Research Funding

- Dissertation Completion Grant — Jan. 2024 - May 2024
  Office of the Provost, GMU, Fairfax, VA
- Summer Research Fellowship — June 2023 - Aug. 2023
  Office of the Provost, GMU, Fairfax, VA — June 2022 - Aug. 2022
- Industrial Immersion Program (IIP) Fellowship — Aug. 2018 - May 2022
  Office of the Provost, GMU, Fairfax, VA
- Graduate Teaching Assistant — Aug. 2022- Dec. 2023
  Department of Mathematical Sciences, GMU, Fairfax, VA — Aug. 2016 - May 2018

Travel Grants

- Graduate Student Travel Grant (GSTG) to attend Joint Mathematics Meeting (JMM) 2024 — Jan. 3-6, 2024
  Joint Mathematics Meeting (JMM) 2022 (*Online*) — April 6-9, 2022

• Association for Women in Mathematics(AWM) Travel grant to present poster at Joint Mathematics Meeting (JMM) 2023 and SIAM Annual Meeting 2022 — Jan. 4-7, 2023, July 11-15, 2022

• Graduate Student Travel Fund(GSTF) award from Office of the Provost (GMU) to attend Heidelberg Laureate Forum — Sept. 18-23, 2022

• The Fields Institute for Research in Mathematical Sciences travel grant to participate in the Fields-CQAM Industrial Problem Solving Workshop — May 6 - 10, 2019

Oral Presentations

• "Robust Data-Driven Recovery of Conservation Laws with Limited Data" — July 8,2024
SIAM Annual Meeting, Spokane, WA

• "Robust Data-Driven Recovery of Conservation Laws", — April 7, 2024
AMS Sectional Meeting, Howard University, Washington DC

• "Inferring Conservation Laws from Data", — Jan. 3, 2024
Joint Mathematics Meeting, San Francisco, CA

• "Utilizing non-negative least squares for data-driven discovery of dynamics", — Nov. 5, 2023
Symposium on BEER, Richmond, VA

• "Inferring Dynamics of Biological Systems", — Jan. 5, 2023
Joint Mathematics Meeting, Boston, MA

• "A Brief Introduction to Data-Driven Dynamical Systems", — Sept. 9, 2022
Student Research Talks, GMU, Fairfax, VA

• "Network Analysis of Biological Systems: Adaptation and Inferring Dynamics", — Aug. 11, 2022
NSF MODULUS, GMU, Fairfax, VA

• "Inferring Dynamics of Biological Systems", — July 11, 2022
SIAM Conference on the Life Sciences, Pittsburg, PA

"Inferring Dynamics of Biological Systems", — May 18, 2022
Biology and Medicine through Mathematics (BAMM!), Richmond, VA

• "Network Analysis of Biological Systems: Adaptation and Inferring Dynamics", — April 8, 2022
3 Minute Thesis (3MT) Finals, GMU, Fairfax, VA

• "Singular Jacobians and Their Effect on Adaptation in Biological Networks", — April 6, 2022
Joint Mathematics Meeting, Online

• "Network Analysis of Biological Systems: Adaptation and Inferring Dynamics", — Jan. 28, 2022
Industrial Immersion Program, Student Research Talks, GMU, Fairfax, VA

• "Singular Jacobians and Their Effect on Adaptation in Biological Networks", — Sept. 24, 2021
We Speak: Early-Career Mathematicians Lightning Talks, Association for Women in Mathematics, Online

• "Adaptability Conditions in Biological Networks", — Jan. 18, 2020
Joint Mathematics Meeting, Denver, CO

• "An Introduction to Robust Perfect Adaptation Networks", — Mar. 1, 2019
Student Research Talks, GMU, Fairfax, VA

Poster Presentations

• "Measure of Adaptation in Biological Networks", — Jan. 4, 2023
Joint Mathematics Meeting, Boston, MA

• "Inferring Dynamics of Biological Systems", — Sept. 19, 2022
Heidelberg Laureate Forum, Heidelberg, Germany

• “Inferring Dynamics of Biological Systems", July 12, 2022
AWM Poster Session at the SIAM Annual Meeting, Pittsburgh, PA

• “Inferring Dynamics of Biological Systems", April 8, 2022
AWM Poster Session at the Joint Mathematics Meeting, Online

• “Deep Learning on Embedded Protein-Protein Interaction Networks to Prioritize Disease Targets", Aug. 5, 2021
National Institutes of Health Summer Research Presentations, Bethesda, MD

• “Mathematical Conditions for Adaptation in Biological Networks", July 10, 2020
AWM Poster Session at the SIAM Annual Meeting, Online

• “Mathematical Conditions for Adaptation in Biological Networks", Feb. 17, 2020
Southeast Center for Mathematical Biology Symposium, Atlanta, Georgia

• “Exploring Robust Perfect Adaptation", Jan. 28, 2019
Southeast Center for Mathematical Biology Symposium, Atlanta, Georgia

Teaching Experience

MATH 446 Numerical Analysis I, *Instructor of Record*
- Semesters Taught: Summer 2019, Summer 2020(*online*), Summer 2024(*online*)

MATH 108: Introductory Calculus with Business Applications for multilingual/multicultural students through INTO Mason, *Instructor of Record*
- Semesters Taught: Fall 2022, Spring 2023, Fall 2023

MATH 108: Introductory Calculus with Business Applications, *Instructor of Record*
- Semesters Taught: Summer 2020(*online*)

MATH 111: Linear Math Modeling, *Instructor of Record*
- Semesters Taught: Summer 2018

Recitation for Math 213: Analytic Geometry/Calculus III, *Graduate Teaching Assistant*
- Semesters Taught: Spring 2018

Recitation for Math 114: Analytic Geometry/Calculus II, *Graduate Teaching Assistant*
- Semesters Taught: Spring 2017, Fall 2017

Recitation for Math 113: Analytic Geometry/Calculus I, *Graduate Teaching Assistant*
- Semesters Taught: Fall 2016

Mentoring and Leadership

• Mentoring High School Student (Kyan Yang), *GMU* Dec. 2023 - *present*
Project: Modelling the MAPK Pathway

• SIAM Executive Board, *GMU* Aug. 2017 - May 2022
Positions held: Treasurer, Vice-President, President

• Organizer for the Student Research Talks (StReeTs) Seminar, *GMU* Jan. 2019 - May 2022

• Representative for the Mathematics Graduate Program, *Graduate and Professional Student Association (GAPSA), GMU* Jan. 2020 - May 2021

• Mentor for NSF funded EXTREEMS-QED Undergraduate Research Program June 2018 - Aug. 2018
GMU, Fairfax, VA

• Member of the SIAM Festivals Working Group, Jan. 2018 - April 2018
Society for Industrial and Applied Mathematics (SIAM)