RYAN WEIGHTMAN

PhD Student in Computational Biology

CONTACT DETAILS

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DESCRIPTION

I am a PhD candidate in Computational Biology and Applied Mathematics at Rutgers University–Camden. My research focuses on developing epidemiological models to inform optimal policy decisions and assess their outcomes. I have extensive experience teaching mathematics at various levels, from middle school to college courses, consistently incorporating the latest pedagogical approaches to enhance learning.

EDUCATION

Rutgers University–Camden Graduate School of Arts & Sciences: Camden, NJ
PhD in the Center for Computational and Integrative Biology: May 2025

R**utgers University**
New Jersey Wind Institute Fellowship through the New Jersey Department for Economic Development: Fall 2023-Fall 2024 and again Fall 2024-Fall 2025

Rutgers University–Camden Graduate School of Arts & Sciences: Camden, NJ
M.S in Pure Mathematics: Awarded May 2020

Rutgers University–Camden Institute for Effective Education: Camden, NJ
Teacher Preparation Program: Mathematics (P-12)
Teaching Certification: Awarded Jan. 2019, CEAS

Rutgers University–Camden College of Arts & Sciences: Camden, NJ
B.A in Mathematics: Awarded May 2018
Minor: Spanish

The University of Salamanca: Salamanca, Spain
Study Abroad: June 2016-Aug. 2016

HONORS AND AWARDS

Dissertation accepted with distinction (May 2025)

Top Scoring Stem Poster, SPARK Graduate Poster Exhibition (April 2025)

IEEE ITSS Lead Institution Award (September 2024)

New Jersey Offshore Wind Fellowship (August 2024)

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American Control Conference Travel Grant (May 2023)

Rutgers Global Grant (January 2023)

Camden Graduate Scholarship recipient (Jan. 2018-May 2020)

Meritorious Achiever Award recipient (Sept. 2014- May 2018)

Academic Excellence Scholarship recipient (Sept. 2014-May 2018)

Mathematical Sciences Career Motivation Award recipient (May 2018)

Phi Beta Kappa Honor Society

International Mathematics Honor Society (Pi Mu Epsilon of New Jersey Gamma)

The National Leadership Honor Society (Omicron Delta Kappa)

Rutgers University–Camden Athenaeum Honor Society

Rutgers University–Camden Civic Scholar Scholarship recipient (Sept. 2014- May 2018)

Rutgers University–Camden Honors College (Sept. 2014-May 2018)

TEACHING EXPERIENCE

Rutgers University–Camden: Camden, New Jersey

Project Lead In Piccoli Lab
Sept. 2019-present

- Provided mentorship to a team consisting of 2 undergraduate students, 6 graduate students, and 1 intern within a research lab setting.
- Offered guidance and support in various aspects of their work, including experimental design, data analysis, and professional development.
- Conducted regular meetings and facilitated collaborative learning opportunities to nurture their growth as researchers.

Teaching Assistant (TA)
Jan. 2020-2022

- Assigned to grade homework assignments, answer student questions, and assist in the administration of exams
- Assisted various professors in the development and implementation of their remote courses including, but not limited to: assisting in the development of lecture videos, attending virtual lectures for technical support, assisting in the development of virtual learning resources, assisting in communication between professor and students
- Courses: Calculus For Business (Spring 2021, Summer 2021, Summer 2022, Spring 2022), Calculus II (Fall 2020, Spring 2021, Fall 2021, Spring 2022), Calculus III, and Differential Equations (Spring 2022), Linear Algebra (Spring 2020), Intro to Statistics (Spring 2020)

TEACHING EXPERIENCE Continued

Rutgers University–Camden: Camden, New Jersey
Instructor
Spring 2019 - Present

- Developed and delivered comprehensive lesson plans and lectures, ensuring clarity and engagement
- Provided impromptu individual and group tutoring sessions to reinforce understanding and address student questions throughout the semester.
- Designed and graded assignments, quizzes, and exams to evaluate student progress and comprehension
- Utilized a variety of teaching methods and technological tools to enhance learning experiences
- Maintained office hours for additional student support and academic advising

Calculus 1
Fall 2023 (one section), Summer 2025 (one section)

- Instructed undergraduate students in Calculus 1, covering topics such as limits, derivatives, integrals, and the Fundamental Theorem of Calculus

Business Calculus
Spring 2025 (one section)

- Instructed undergraduate students in Calculus 1, covering topics such as limits, derivatives, integrals, and the Fundamental Theorem of Calculus as they apply to business majors.

Numbers and Beyond
Spring 2020 (one section), Spring 2021 (one section)

- Instructed undergraduate students in a survey of mathematical topics, covering topics such as inductive/deductive reasoning, logical and quantitative reasoning, and working with rational and irrational numbers

Introduction to Math Thought
Summer 2021(one section), Fall 2021 (two sections)

- Instructed undergraduate students in a survey of mathematical topics, covering basic topics of geometry, graph theory,

Accelerated Elementary/Intermediate Algebra
Spring 2019(one section), Fall 2019 (two sections), Fall 2020 (one section)

- Covering topics such as linear equations, inequalities, functions, and polynomial expressions

Introduction to College Algebra
Fall 2024 (one section)

- Covering topics such as linear equations, inequalities, functions, and polynomial expressions

Course Developer
Sept. 2020

- Assigned to develop the online section of an introductory algebra course for Rutgers University–Camden
- Involving, but not limited to creating: lecture videos, syllabus, course schedule, exams and homework, grading scale, and course expectations for a partially asynchronous version of the course

TEACHING EXPERIENCE CONTINUED

Collingswood High School: Collingswood, New Jersey

Long-Term Substitute Teacher
March. 2018-June 2018

- Possess a State of New Jersey Substitute Teacher Certification
- Long-term substitute for AP Calculus and Honors Trigonometry (April 2018-June 2018)
- Instruct 80 sophomore, junior, and senior year students in the absence of the classroom teacher
- Help to prepare AP Calculus students for the College Board AP exam
- Create, implement, and manage online resources for students participating in a Twilight program

Substitute Teacher
Sept. 2016-June 2019

- Substitute in the absence of cross-disciplinary teachers and student aids in grades 6-12
- Implement classroom management strategies in the absence of the regular classroom teacher

Cinnaminson Middle School: Cinnaminson, New Jersey

Student Teacher
Sept. 2018-Dec. 2018

- Plan and execute Common Core-aligned pre-algebra lessons for 90 seventh grade students of varying skill-levels
- Participate in parent-teacher conferences, staff meetings, and department meetings
- Implement classroom management strategies

First Korean United Methodist Church (FKUMC): Cherry Hill, NJ

Pre-Calculus and AP Calculus Instructor
June 2018-Sept. 2018

- Teach 12 students in Pre-Calculus and 4 in AP Calculus during a summer enrichment program (totaling 45 hours per class)
- Prepare curriculum and materials
- Grade assignments
- Administer assessments

Self-Employed: Collingswood, NJ

Math Tutor
June 2013-2018

- Tutor 15 students ranging from 4th grade math to college calculus including ESL and ELL students
- Prepare grade-level curriculum

RESEARCH EXPERIENCE

Rutgers University–Camden: Camden, New Jersey

Graduate Researcher for the Center for Computational and Integrative Biology
Fall 2021-Present

- Principal Investigator: Dr. Benedetto Piccoli
- Topics of Study:
  - Apply systems of ordinary differential equations to various biological problems.
  - Develop models in order to quantify biological systems and provide a pipeline for future computational research.

Masters Thesis in Pure Mathematics
Fall 2020

- Supervisor: Dr. Siqi Fu
- Topic of study: Properties of bounded domains and minimizing the first Dirichlet Laplacian Eigenvalue.

Research Assistant for the Center for Computational and Integrative Biology
Fall 2020

- Supervisors: Dr. Benedetto Piccoli and Dr. Sean McQuade
- Topic of Study: Developing extended SIR model coupled with Optimal Control Scheme in order to shed light on COVID-19 impact on the state of New Jersey

Researcher at CIRCLES I-24 Motion Test Fall 2022

- Attend planning meetings for the development of a 100 autonomous vehicle traffic experiment
- Develop plan for car deployment and collection for experiment days
- Assist hardware team in installation and removal of key hardware for data collection
- Direct car deployment live for 5 days of testing during the actual experiment

Rutgers University

Fellow of the Wind Institute
Fall 2023-Fall 2024

- Receive grant funding for work on projects relating to offshore wind energy development
- Develop research questions surrounding optimal turbine placement in the state of New Jersey
- Present progress at wind energy conference
- Attend various networking and informational events surrounding the New Jersey Wind energy landscape

Yale University: New Haven Connecticut

Student Facilitator
Spring 2021-Fall 2021

- Receive grant funding for work on projects relating to high performance computing
- Present goals of the proposed project
- Give weekly project updates to project facilitators.
- Present the progress made on the proposed project over the lifetime of the grant (6 months)

RESEARCH PRODUCTS: PUBLICATIONS

1. Weightman, R. (2021). Steiner symmetrization and the eigenvalues of the Laplace operator on polygons (Masters dissertation, Rutgers University-Camden Graduate School).

2. McQuade, S. T., Weightman, R., Merrill, N. J., Yadav, A., Trélat, E., Allred, S. R., & Piccoli, B. (2021). Control of COVID-19 outbreak using an extended SEIR model. Mathematical Models and Methods in Applied Sciences, 1-26.

3. Luo, Q., Weightman, R., McQuade, S. T., Dıaz, M., Trélat, E., Barbour, W., ... & Piccoli, B. (2022). OPTIMIZATION OF VACCINATION FOR COVID-19 IN THE MIDST OF A PANDEMIC. Networks and Heterogeneous Media, 17(3), 443-466.

4. Weightman, Ryan, Anthony Sbarra, and Benedetto Piccoli. "Coupling compartmental models with Markov chains and measure evolution equations to capture virus mutability." Mathematical Models and Methods in Applied Sciences(2022).

5. Weightman, Ryan, and Benedetto Piccoli. "Optimization of non-pharmaceutical interventions for a mutating virus." 2023 American Control Conference (ACC). IEEE, 2023.

6. Hayat, A., Alanqary, A., Bhadani, R., Denaro, C., Weightman, R., Xiang, S., ... & Piccoli, B. (2023). Traffic smoothing using explicit local controllers.

7. Weightman, R., Moroney, S., Sbarra, A., & Piccoli, B. (2023). Advanced Models for COVID-19 Variant Dynamics and Pandemic Waves. Mathematical Models and Computer Simulations for Biomedical Applications, 33, 217.

8. Morand, V., Müller, N., Weightman, R., Piccoli, B., Keimer, A., & Bayen, A. M. (2024). Deep learning of first-order nonlinear hyperbolic conservation law solvers. Journal of Computational Physics, 113114.

9. Weightman, R., Akinode, T., & Piccoli, B. (2024). Optimal control of pandemics via a sociodemographic model of non-pharmaceutical interventions. Networks and Heterogeneous Media, 19(2), 500-525.

10. Weightman, R., & Piccoli, B. (2024). Managing an Epidemic Using Compartmental Models and Measure Differential Equations. In Predicting Pandemics in a Globally Connected World, Volume 2: Toward a Multiscale, Multidisciplinary Framework through Modeling and Simulation (pp. 157-182). Cham: Springer Nature Switzerland.

11. Hayat, A, et al. "Traffic smoothing using explicit local controllers: Experimental evidence for dissipating stop-and-go waves with a single automated vehicle in dense traffic." IEEE Control Systems 45.1 (2025): 95-110.

12. Ameli, M, et al. "Design, preparation, and execution of the 100-AV field test for the CIRCLES consortium: Methodology and implementation of the largest mobile traffic control experiment to date." IEEE Control Systems 45.1 (2025): 139-155.

13. Benedetti, G, Weightman, R., and Piccoli, B. "Optimizing overlapping non-pharmaceutical interventions with a socio-demographic model." Bollettino dell'Unione Matematica Italiana (2025): 1-22.

RESEARCH PRODUCTS: PUBLICATIONS Continued

14. Sun, Yue, et al. "A Review of Urban Resilience Frameworks: Transferring Knowledge to Enhance Pandemic Resilience." arXiv preprint arXiv:2503.17371 (2025).

15. Weightman, R. Mathematical Modeling and Control of Viral Infections: Studying Mutation Dynamics and Adaptive Response. Diss. Rutgers, The State University of New Jersey-Camden, 2025.

RESEARCH PRODUCTS: PRESENTATIONS

1. R.Weightman. “Symmetrization and the first fundamental tone.” Presentation at the Department of Mathematical Sciences, Rutgers University–Camden Honors Convocation 2021

2. R. Weightman. “Epidemiological Modeling of Covid-19 Over Time.” Presentation at Rutgers Camden Center for Computational and Integrative Biology Seminar 2022

3. R. Weightman. “Epidemiological Modeling of a Mutating Virus.” Poster Presentation at Rutgers Camden Graduate Research Symposium 2022

4. R. Weightman. “Studying City Resilience to a Virus Through Mobility Modeling.” Poster presentation at Rutgers Camden Center for Computational and Integrative Biology Retreat 2023

4. R. Weightman. Organizer of a special session titled “Mathematical modeling of pandemics” The 13th AIMS Conference on Dynamical Systems, Differential Equations and Applications 2023

5. R. Weightman. “Incorporating Viral Mutation Into Epidemiological Models.” Presentation at Rutgers Camden Center for Computational and Integrative Biology Seminar 2023

6. R. Weightman. “ Optimization of non-pharmaceutical interventions for a mutating virus.” Presentation at the 2023 American Control Conference (ACC).

7. R. Weightman. “Gleaning Population Level Insights From Host Level Viral Load Dynamics.” Poster presentation at Rutgers Camden Center for Computational and Integrative Biology Summer Research Showcase 2024

8. R. Weightman. “A mathematical model for the optimal design and network integration of an offshore wind farm in New Jersey” Presentation and poster presentation at The Wind Institute Research Symposium- NJDEA 2024

9. R. Weightman. “Understanding Pandemic Transmission Via A High Fidelity Hybrid Epidemioogical Model” Rutgers Camden Showcase of Projects, Art, Research, and Knowledge (Winning presentation)

10. R. Weightman. “Epidemiology and City Mobility.” Presentation at Rutgers Camden Center for Computational and Integrative Biology Seminar 2025

11. R. Weightman. “Being a Graduate Researcher In Mathematics.” Guest speaker for undergradute course titled “Careers in Mathematics” 2025

ACADEMIC SERVICE

1. Organized a special session at 13th AIMS Conference on Dynamical Systems, Differential Equations and Applications, Wilmington, NC USA in May 31 - June 4, 2023

2. Peer reviewer: Manuscript reviewer for academic journals September 2021-Present

3. Undergraduate and graduate student mentor. Support the research of various students in the Mathematial Sciences department as well as the Center for Computational and Integrative Biology at Rutgers University–Camden, September 2021-Present

4.Voorhees Middle School, Rutgers–Camden collaboration: Designed and taught interactive mathematics lessons to 8th grade students during department outreach events aimed at introducing college-level concepts in an accessible and engaging format. Presentations titled:

- “Differential Equations: Using math to predict the future”November 2024
- “Cryptography: The Mathematics of Codemaking!”June 2025
- “Cryptography: Codemaking and codebreaking!” June 2025 (second day of event)

5. Represented the Mathematics Department at Admitted Students Day, engaging prospective students, answering questions about the program, and promoting departmental initiatives

6. Represented the Mathematics Department at the Discovery Fair, discussing the student experience and academic pathways of the math major with prospective and undecided students

7. Gave reflective talk about being a PhD student in a Mathematical Careers course titled “Being a Graduate Researcher in Math!”, Spring 2024

8. Presented research on traffic modelling titled “The Largest Traffic Experiment In History” at the Faculty Research and Creative Activity Symposium, Rutgers University–Camden (2025)

COMPETENCY IN THE FOLLOWING PROGRAMS:

MATLAB

Python

HTML

GitHub

LaTex (for scientific writing)

Canvas

Youtube (for creating educational content)