

Juniper Cocomello

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I am a PhD candidate in the Division of Applied Mathematics at Brown University working with Prof. Kavita Ramanan. I study interacting stochastic processes on sparse and heterogeneous random networks, and their applications.

Education

- **Brown University** **Providence, RI**
PhD Candidate, Applied Mathematics (expected graduation: May 2025) *Sep 2019 - present*
 - Coursework including: Theory of Probability, Interacting Particle Systems, Computational Probability and Statistics, Graphs and Networks, Nonlinear Dynamical Systems.
 - Transitional *M.S. in Applied Mathematics* en route to PhD Awarded in May 2021.
- **New York University** **New York, NY**
M.S. in Mathematics *Sep 2018 - May 2019*
 - Completed this degree as part of a 5 year Bachelor-Masters program.
 - Coursework including: Stochastic Calculus, Numerical Methods.
- **New York University** **New York, NY**
B.A. in Mathematics, summa cum laude, GPA: 3.957 *Sep 2014 - May 2018*
 - Minor in Computer Science.
 - Honors: NYU Presidential Honors Scholar (2015 - 2018), Dean's List (May 2015 - May 2018), Phi Beta Kappa, Mathematics Awards for Academic Achievement.
 - Coursework including: Probability, Algorithms, Data Science, Mathematical Modeling.

Research Experience

- **Brown University** **Providence, RI**
Graduate Student Researcher *May 2021 - present*
 - Advisor: [Prof. Kavita Ramanan](#).
 - Dissertation title: Heterogeneous stochastic network dynamics in living and artificial systems.
 - Study of interacting stochastic processes on networks, with a focus on understanding the role of network heterogeneity on possibly non-Markovian stochastically controlled dynamics, with applications to both living and artificial systems.
 - Application areas of interest: neuroscience, epidemics, computer networks, neural networks and artificial intelligence.
- **Brown University** **Providence, RI**
Independent Study Project *May 2020 - Aug 2020*
 - Research Mentor: Prof. Kavita Ramanan.
 - Studied Markovian dynamics on random graphs, in both dense and sparse regimes using mean-field and local convergence techniques. Formulated a discrete model on a heterogeneous graph and analyzed its asymptotic behavior. Manuscript in preparation.
- **New York University** **New York, NY**
Summer Undergraduate Research Experience *May 2017 - Aug 2017*
 - Research Mentor: Prof. S. R. Srinivasa Varadhan.
 - Studied Markov Chains and Markov Decision Processes and their applications to single player games; analyzed optimal and ϵ -optimal deterministic policies.

Publications

J. Cocomello and K. Ramanan, *Exact description of limiting SIR and SEIR dynamics on locally tree-like graphs*, 2023, preprint [arXiv:2309.08829](https://arxiv.org/abs/2309.08829).

Invited Talks.....

- o *Exact description of limiting SIR and SEIR dynamics on locally-tree like graphs.* Stochastic System Session, INFORMS annual meeting. October 2023. Phoenix, AZ.

Contributed Talks.....

- o *Exact description of limiting SIR and SEIR dynamics on locally-tree like graphs.* Spectra Mathematics Conference. September 2023.
- o *Using Math to Understand Network Dynamics.* Research Matters. Brown University. April 2023. Video available [here](#).
- o *Predicting SIR epidemics on large random networks,* Social Media and QSR Flash Session INFORMS Annual Meeting. Indianapolis, IN. October 16-19 2022.
- o *Analyzing SIR epidemics on large sparse networks.* Trans Day of Math. Dec 13 2022.
- o *Dynamics on Sparse and Heterogeneous Networks - Tutorial session.* Led three 1-hour long tutorial sessions as part of Prof. Kavita Ramanan's lecture series. Summer School: Mathematics of Large Networks Erdős Center. Budapest, Hungary. May 30th - June 3rd 2022.

Awards.....

- o *Dunmu Ji Award.* Division of Applied Mathematics, Brown University. May 2023.

Teaching and Mentoring

Teaching Experience.....

- o **Brown University** **Providence, RI**
Summer Instructor *July 2022 - August 2022*
 - CEMA-0925: Real-world Networks: using Math to understand Complex Systems (Summer 2022, in person). Designed and taught this pre-college course on the mathematical foundations of network science, with an emphasis on modeling tools and applications.
- o **Brown University** **Providence, RI**
Graduate Teaching Assistant *Sep 2020 - August 2023*
 - APMA-1655: Honors Statistical Inference I (Fall 2020, online)
 - APMA-1650: Statistical Inference I (Spring 2021, online)
 - CEMA-0925: Real-world Networks: using Math to understand Complex Systems (Summer 2023, in person)
- o **New York University** **New York, NY**
Graduate Teaching Assistant *Sep 2018 - May 2019*
 - MATH-UA 121: Calculus I (Fall 2018, in person)
 - MATH-UA 121: Calculus I (Spring 2019, in person)
- o **New York University** **New York, NY**
Undergraduate Tutor *Sep 2018 - May 2019*
 - Led walk-in tutoring sessions in Pre Calculus, Calculus I-III, and Linear Algebra.
 - Helped students from a variety of backgrounds (math majors, pre-med, natural sciences majors).
- o **New York University** **New York, NY**
Grader *Sep 2015 - Aug 2018*
 - Graded weekly assignments for Calculus II (Fall 2015), Linear Algebra (Spring 2016), and Probability (Summer 2018).

Pedagogy training.....

- o **Brown University** **Providence, RI**
Sheridan Teaching Seminar - Reflective Teaching (Certificate I) *Fall 2020*

Semester-long seminar designed to develop and refine evidence-based teaching and assessment strategies. Modules include: Critical Reflection, Inclusive Classrooms, Learning Design, Active Learning.
- o **Brown University** **Providence, RI**
Sheridan Center for Teaching and Learning - Teaching Consultant Program *Fall 2021*

Semester-long learning community in which graduate students and postdocs develop and refine teaching skills. Responsibilities include facilitating Reflective Teaching Seminar workshops, and creating a teaching philosophy statement.

- Brown University** **Providence, RI**
Sheridan Center for Teaching and Learning - Course Design Seminar *Spring 2022*
 Semester-long seminar, on integrated course design process aimed at developing syllabuses, signature assignments, and teaching strategies for a semester-long course.

Mentoring Experience.....

- Undergraduate Students Mentored:**
 - *Chen Li* (AY 2023-2024). Co-mentored with prof. Kavita Ramanan on a project towards an Honors Thesis.
 - *Ayushman Choudhury, Kyle Wisialowski* (Fall 2023). Mentored a [Brown Applied Math Directed Reading Program](#) project titled "Mathematical Models of Disease Spreading".
 - *Jessica Li* (Fall 2021). Mentored a [Brown Applied Math Directed Reading Program](#) project titled "Markov Chains: Theory, Applications and Simulations".
 - *Shreyas Rao* (Spring 2021 - Spring 2022). Co-mentored the [Undergraduate Teaching and Research Awards](#) project "Generalized Interacting Processes: Simulation, Conjectures and Proofs", under the supervision of Prof. Kavita Ramanan.
 - *George Daccache, Linghai Liu, and Zhiyuan Zhou* (Summer 2020). Mentored a Brown Undergraduate Mathematics Project (BUMP) about understanding long term behavior and convergence to equilibrium of Markov chains.

DEI, Service and Outreach

- Diversity, Equity and Inclusion Committee of the Division of Applied Mathematics** **Brown University**
Committee Member *Jan 2021 - May 2023*
 As a member of the DEI Committee I have worked on a variety of initiatives to foster diversity, equity and inclusion in the Division. These includes organizing workshops on DEI topics and Applied Math town halls, contributing in revising the department DIAP, advocating for changes to the graduate program to better serve HUGs.
- Social Equity & Applied Math (SEAM) Seminar** **Brown University**
Participant and Working Group Member *Sep 2021 - present*
- Math CoOp Outreach Program** **Brown University**
Member *Jan 2021 - present*
 Working on a video presentation that will be accessible to high-school students and the general public that discusses math models of the spread of epidemics (and viruses on computer networks), explains the R_0 parameter that is often cited in the media, and the impact of network structure on outbreak size.
- Society for Industrial and Applied Mathematics (SIAM) – Brown Chapter** **Brown University**
President *Sep 2021 - August 2022*
- Society for Industrial and Applied Mathematics (SIAM) – Brown Chapter** **Brown University**
Vice President *Sep 2022 - present*
 The [Brown SIAM Student Chapter](#) is a group for students, postdocs, faculty, staff, and visitors interested in applied math. Our goal is to foster an active interdisciplinary STEM community at Brown. We organize professional, academic and social events for undergrad and graduate students.
- Applied Math Graduate Student Seminar** **Brown University**
Organizer *October 2021 - present*
 The [Graduate Student Seminar](#) is a forum for graduate students in the Division of Applied Mathematics to share their current research (or just talk about some interesting math) in an informal and supportive environment, practice their math presentation skills, and receive feedback from peers.
- Applied Math Undergraduate/Graduate Mentoring Program** **Brown University**
Graduate Mentor *Fall 2021, Fall 2023*
 Mentored four students, providing advice on courses, research, and summer opportunities.
- oSTEM Mentorship Program** **oSTEM, Inc.**
Mentor *Sep 2021 - May 2023*

Professional Affiliations

- o Out in Science, Technology, Engineering, and Mathematics (oSTEM).
- o Association for Women in Mathematics (AWM).
- o [The Rose Whelan Society at Brown University](#).
- o Society for Industrialized and Applied Mathematics (SIAM).

- American Mathematical Society (AMS).
- Phi Beta Kappa Society (ΦBK).
- Applied Probability Society (APS).

Skills

- **Programming:** MATLAB, Python, Java.
- **Languages:** Bilingual Italian and English; beginner Spanish.