Julia Costacurta

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Education

Ph.D. in Electrical Engineering, Stanford University Expected 2025
Ph.D. Minor in Education

M.S. in Electrical Engineering, Stanford University 05/2022

B.S. in Biomedical Engineering, Johns Hopkins University 05/2020
Additional Majors: Mathematics, Applied Mathematics & Statistics

Research Experience

Stanford University Stanford, CA
Graduate Researcher, Linderman Lab 03/2021-Present
Primary Advisor: Scott Linderman
Research Topic: statistical models for neuroscience data and applications
Projects:
- Time-warped autoregressive hidden Markov models for behavioral segmentation
- Incorporating a neuromodulatory signal into RNN models of task computation/dynamics

Johns Hopkins University Baltimore, MD
Undergraduate Researcher, Neuromedical Control Systems Lab 09/2017-05/2020
Primary Advisor: Sridevi Sarma
Research Topic: control theory applied to closed-loop neuroprosthesis control

Fields Institute for Research in the Mathematical Sciences Toronto, ON, Canada
Undergraduate Summer Researcher Summer 2019
Primary Advisors: Adam Stinchcombe and Mihai Nica
Research Topic: solving elliptic PDEs with Brownian motion

Teaching Experience: Primary Instructor

Introduction to Matrix Methods (ENGR 108), Stanford University Summer 2024
- Prepared and taught interactive lectures, held office hours, wrote exams, and coordinated teaching team for an upper-level undergraduate course in computational linear algebra
- 12 students from a range of backgrounds (undergraduates, graduate students, visiting)
- 4.83/5 rating: “Overall, how would you describe the quality of the instruction in this course?”

Linear Algebra, Stanford Summer Engineering Academy Summer 2023
- Designed in-class activities and taught inquiry-oriented linear algebra and college readiness content for four-week bridge program for first-generation/low-income and underrepresented incoming freshmen (20 students in class)
- 4.82/5 rating: “How would you rate the overall effectiveness of the instructor’s teaching?”

Selected quotes from course feedback:

- "I hope you are able to take this class with Julia. She's the best! Very personable, accommodating, efficient, patient, and really cares about her students understanding what's being taught in class! Her style of teaching is versatile, and incorporates different individual and group work for students to gain more familiarity with concepts." (ENGR 108)
- "From the simple and clear lecture slides, the in class group session, this class was by far the best math class taught at stanford. I also appreciated how much the instructor valued feedback from the exit ticket and made sure to debrief the feedback from the previous lecture onto the next lecture." (ENGR 108)
- "The instructor I had (Julia) was absolutely amazing. She had a visible passion for math and actually cared about if we understood. But as the same time was empathetic towards our situation and how busy we were." (Stanford Summer Engineering Academy)

PUBLICATIONS

Preprints

- **JC Costacurta**, S Bhandarkar, D Zoltowski, SW Linderman. Structured flexibility in recurrent neural networks via neuromodulation. BiorXiv. (Under review at NeurIPS 2024)

Refereed Conference & Journal Publications

- **JC Costacurta**, L Duncker, B Sheffer, AH Williams, W Gillis, C Weinreb, JE Markowitz, SR Datta, SW Linderman. Distinguishing discrete and continuous behavioral variability using warped autoregressive HMMs. 36th Conference on Advances in Neural Information Processing Systems (NeurIPS). New Orleans, 2022.
- C Martin, H Zhang, **JC Costacurta**, M Nica, A Stinchcombe. Solving Elliptic Equations with Brownian Motion: Bias reduction and Temporal Difference Learning. Methodology and Computing in Applied Probability. 2021.
- **JC Costacurta**, L Osborn, NV Thakor, SV Sarma. Designing Feedback Controls for Human-Prosthetic Systems Using H-Infinity Model Matching. 40th Annual International Conference of the IEEE Engineering in Medicine and Biology Society (EMBC). Honolulu, 2018.

Conference Abstracts

- **JC Costacurta**, S Bhandarkar, D Zoltowski, SW Linderman. Neuromodulated recurrent neural networks. Junior Scientists Workshop on Recent Advances in Theoretical Neuroscience. Trieste, 2024.
- **JC Costacurta**, S Bhandarkar, D Zoltowski, SW Linderman. Neuromodulated recurrent neural networks on a timing task. Computational and Systems Neuroscience (COSYNE). Lisbon, 2024.
- **JC Costacurta**, AH Williams, B Sheffer, C Weinreb, W Gillis, JE Markowitz, SR Datta, SW Linderman. Time-warped state space models for distinguishing movement type and vigor. Computational and Systems Neuroscience (COSYNE). Lisbon, 2022. (waitlisted for talk)
- **JC Costacurta**, JM Lee, R Sczerba, SV Sarma. An Interactive Applet for Teaching Biomedical Applications of Feedback Control Theory. Biomedical Engineering Society (BMES). Philadelphia, 2019.

- S Aggarwal, P Chansky, **JC Costacurta**, N Garza, T James, M McDonald, N Mohan, S Rahmeh, E Logsdon, S Harvey. Deskilling Breast Cancer Biopsy Using Novel Device for Coordination. Biomedical Engineering Society (BMES). Philadelphia, 2019.
- MC Rosenberg, M Eyre, **JC Costacurta**, KM Peters, KM Steele. Kinematic and myoelectrical response to ankle exoskeletons during non-steady state locomotion in healthy adults. Congress of the International Society of Biomechanics. Calgary, 2019.
- **JC Costacurta**, L Osborn, NV Thakor, SV Sarma. Sensitivity Analysis of Feedback Controllers for Human-Prosthetic Systems Using H-Infinity Model Matching. Biomedical Engineering Society (BMES). Atlanta, 2018.

Teaching Experience: TA & Workshops

Teaching Assistant

Teaching Assistant at Stanford University 2023-Present
Lead interactive problem-solving sessions, held office hours, and assisted with writing/grading homework and exams for courses in Engineering and Statistics Depts.
- Introduction to Matrix Methods: undergraduate computational linear algebra course (F23)
- Introduction to Data Science: gateway undergraduate data science course in Python (W24)

Teaching Assistant at Johns Hopkins University 2018-2020
Taught sections, held office hours, and graded homework and exams for courses in Mathematics and Biomedical Engineering Depts.
- Differential Equations: undergraduate ordinary differential equations course (F18, S19, S20)
- Systems and Controls: undergraduate biomedical control theory course (S19, S20)
- Calculus III: undergraduate multivariable calculus course (F19)

Workshop Development and Instruction

Coding for Engineers Instructor at Stanford Equity and Inclusion Office 2022-2024
Designed and co-taught scientific Python course for students in Equity and Inclusion Office summer programs

Graduate Teaching Consultant at Stanford Center for Teaching and Learning 2024-Present
Conducted small-group feedback sessions for graduate teaching assistants, delivered workshops on effective teaching strategies

Engineering Learning Consultant at Stanford Center for Teaching and Learning 2022-2024
Developed and presented STEM academic skills workshops, e.g. Data Visualization in Python, Introduction to LaTeX

Data Science Instructor at The Carpentries 2023-Present
Certified to teach data science workshops (Python and R) via The Carpentries global network
- Shell, Git, Plotting & Programming in Python: University of Puerto Rico (Summer 2024)
- Data Carpentry Ecology with Python: Henry Ford Community College (Spring 2024)
- Introduction to Git, Bash, & Python: Stanford Neurosciences Program (Fall 2023, 2024)
- Introduction to R: Stanford Cardiovascular Institute Summer Program (Summer 2023)

Co-Instructor at Stanford Jail & Prison Education Project 2024-Present
Design and teach interactive lessons at San Francisco County Jail #3

Workshop Leader at Women in Data Science June 2022
Prepared and delivered tutorial on Hidden Markov Models (10k+ Youtube views)

Tutoring

Course Assistant at Stanford Additional Calculus for Engineers Fall 2021
Hosted weekly drop-in support hours aimed at FLI/underrepresented students enrolled in Ordinary Differential Equations for Engineers

Volunteer Tutor at Johns Hopkins Jail Tutorial Project 2017-2020
Tutored incarcerated students in GED math at Jessup Women's Correctional Institution

PILOT Leader at Johns Hopkins University 2017-2018
Led supplemental problem-solving sessions for students enrolled in Linear Algebra

Work with Younger Learners

Teaching Assistant and Counselor at Bridge to Enter Advanced Mathematics 2020
Assisted in-class and led small-group check-ins for four-week summer program for rising eighth graders from underserved backgrounds in NYC (virtual due to COVID)

Course Assistant at Art of Problem Solving 2017-2018
Answered questions during live online pre-algebra course for middle school students

DEI Work, Mentorship, & Outreach

Equity & Inclusion Initiatives at Stanford Engineering

Application Reader for Summer Undergraduate Research Fellowship 2021-Present
Participate in yearly holistic review of over 500 applications for Stanford summer research program, targeted at students from underrepresented backgrounds interested in PhDs

Program Coordinator for Summer Undergraduate Research Fellowship 2021
Organized professional development workshops, graduate school application resources, and social events for visiting summer undergraduates from underrepresented backgrounds

Mentoring & Outreach

Undergraduate research mentoring

- Shaunak Bhandarkar (2023-2024): Stanford Math undergraduate honors thesis, now Neuroscience PhD student at Princeton
  - Project: Relating Neuromodulated RNNs to LSTMs in Theory and Experiment
  - Publication: co-first author on Neuromodulated RNN preprint (submitted to NeurIPS)
- Evelyn Song (Summer 2024): Stanford Biomedical Computation undergraduate
  - Project: Applying S5 Model to Neural Data

One-on-one mentoring
Mentor first-year graduate students and undergraduate students interested in applying to graduate school, with a focus on women and students from underrepresented backgrounds
- Stanford Women in EE (2022-Present)
- Stanford Enhancing Diversity in Graduate Education (EDGE) (2022-Present)
- Project SHORT (2020-2023)
- Stanford Undergraduate Research Fellowship (Summers 2022-Present)
- Stanford Women's Community Center STEM Mentoring (2021-Present)
- Johns Hopkins Whiting School of Engineering, Women Mentoring (2020-2023)
- Stanford Inclusive Mentoring in Data Science (Spring 2022)
- Stanford Women in Math Mentoring (2021-2022)

Penpal outreach
Exchange letters with middle and high school students from underserved schools, to demystify/humanize scientific careers and offer advice
- Letters to a Pre-Scientist (2021-Present)
- Stanford Science Penpals (2020-2022)

Remote Research Assistant for Mt Tamalpais College at San Quentin Prison Fall 2023
Sourced articles for incarcerated students completing biology research projects

Professional Activities

Professional Development

Stanford Preparing Future Professors Program 2023
Shadowed a faculty member at SF State and participated in career development seminar, with focus on teaching-intensive institutions

Stanford Mind, Brain, Computation, and Technology Member 2021-Present
Travel funding and seminars focused on computational neuroscience

Center for the Integration of Research, Teaching, and Learning Certificate 2022-Present
Coursework and seminars focused around evidence-based teaching practices

Methods in Computational Neuroscience Summer Course August 2022
Month-long summer course focused on learning techniques and history of the field of computational neuroscience, culminating in a final project (mentor: James Fitzgerald)

Service to Community

Stanford Wu Tsai Neurosciences Seminar Host Fall 2023
Chosen to host a speaker for Stanford's primary neuroscience seminar series

Stanford Mind, Brain, Computation, and Technology Seminar Organizer 2022-2023
Hosted speakers for student-organized computational neuroscience speaker series

Mentoring Undergraduate Research in the Computational Sciences 2022-2023

Organized working group and seminar series on best practices for mentoring undergraduates

Stanford Women in Electrical Engineering Social Chair 2020-Present
Plan community-building events for women in the department

Grants, Honors, and Awards

Funding Awards

Diversifying Academia, Recruiting Excellence Fellowship 2023-2025
Two-year highly selective fellowship awarded to advanced graduate students interested in academic careers, who will diversify the professoriate

National Science Foundation Graduate Research Fellowship 2020-2023
National fellowship awarded in support of graduate studies at Stanford

Sang Samuel Wang Stanford Graduate Fellowship 2020-2025
Internal fellowship awarded in support of graduate studies at Stanford

Enhancing Diversity in Graduate Education Fellowship 2020-2025
Internal fellowship awarded to graduate students from underrepresented backgrounds

Goldwater Scholarship 2019
National award for excellence in undergraduate research

Departmental Graduation Awards

- Richard J. Johns Award for Outstanding Academic Achievement, JHU Biomedical Engineering)
- Departmental Honors, JHU Biomedical Engineering and Applied Mathematics & Statistics
- Prof. Joel Dean Excellence in Teaching Award for Undergraduates, JHU mathematics (awarded to one teaching assistant yearly)
- David T. Yue Memorial Teaching award, JHU Biomedical Engineering