

MAXIMILIAN M. NGUYEN

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EDUCATION	Princeton University 2019-2024 <i>Princeton, NJ</i> Doctor of Philosophy, Quantitative and Computational Biology Master of Arts, Quantitative and Computational Biology (2021)
	Cornell University 2015-2017 <i>Ithaca, NY</i> Master of Science, Chemical and Biomolecular Engineering
	Georgia Institute of Technology 2011-2014 <i>Atlanta, GA</i> Bachelor of Science, Chemical and Biomolecular Engineering
	Emory University 2028 (anticipated) <i>Atlanta, GA</i> Doctor of Medicine

RESEARCH EXPERIENCE	Internship 2024 Oxford University, <i>Clinical Research Unit Nepal</i> Assist with ongoing clinical trials being conducted in hospitals in Kathmandu, Nepal to explore the efficacy of various antiviral drugs to effect morbidity rates, hospitalization time, and pharmacokinetics in COVID, pneumonia, and influenza. Explored the outcomes and perceptions for inappropriate use of antibiotics in the management of common childhood illness in Nepal.
	Graduate Student 2020-Present Simon Levin Group Princeton University, <i>Ecology and Evolutionary Biology</i> Focused on epidemiological modeling in the wake of the COVID-19 epidemic. Used and developed a variety of analytical, agent-based, and statistical modeling approaches to explore the concepts of herd immunity, overshoot, and the effects of behavior and spatial heterogeneity on epidemic outcomes. Also explored public health issues in the context of the COVID-19 pandemic in Uttar Pradesh, India and chicken livestock in small villages in Madagascar.
	Graduate Researcher 2019-2020 Collaboration with Andreas Meyer Princeton University, <i>Lewis-Sigler Institute</i> <i>Princeton University, Center for the Physics of Biological Function</i> Investigated power-law scaling in B-cell clone-size distributions in the immune system. Developed maximum-likelihood estimation methods that can accurately quantify the scaling exponent for power-law relationships from sampled data. Developed heuristics for determining when sampled data shows overdispersion and proposed mechanisms on how to account for them.
	Research Assistant 2017-2019 Sahand Hormoz Group Harvard Medical School, <i>Systems Biology</i> <i>Dana-Farber Cancer Institute, Biostatistics and Computational Biology</i> Developed experimental pipeline for integrating Jak2 V617F mutation genotyping with single-cell RNA-seq for samples from patients with myeloproliferative neoplasms. Worked on a method for single-molecule fluorescent in-situ hybridization (smFISH) and multiplexed FISH for intestinal crypt cryo-sections and spatially-resolved whole transcriptome applications. Helped with cloning and development of a Cas9 system capable of site-directed integration in human cells.
	Visiting Research Fellow 2017 Jeremy Gunawardena Group Harvard Medical School, <i>Systems Biology</i> Surveyed theoretical signatures for distinguishing equilibrium from nonequilibrium behavior in

eukaryotic information processing. Applied those techniques to experimental data of single-molecule tracking of transcription factors in eukaryotic gene regulation.

Master's Student

2015-2017

Christopher Alabi Group | Cornell University, *Chemical and Biomolecular Engineering*

Investigated physicochemical properties of sequence-defined synthetic macromolecules (oligoTEAs) for use as endosomal escape agents in drug delivery vectors. Used partitioning experiments to obtain microscopic measurements of pKa and hydrophobicity and analytical techniques from equilibrium statistical mechanics to uncover heuristics for molecule design.

Research Intern

2015

Meltem Urgun-Demirtas Group | Argonne National Laboratory, *Energy Systems*

Modeled the addition of biochar in the conversion of wastewater sludge to renewable biogas. Developed protocols to optimize methane gas production and methane gas purity.

Undergraduate Researcher

2014

Elsa Reichmanis Group | Georgia Tech, *Chemical and Biomolecular Engineering*

Modeled the charge carrier mobility of P3HT organic semiconductors for field-effect transistor applications. Developed knowledge of meta-analyses techniques and relevant software for data mining.

Undergraduate Researcher

2014

Chaitanya Deo Group | Georgia Tech, *Nuclear and Radiological Engineering*

Created samples of surrogate Nb/Ti metal alloys via arc melting, rolling, polishing, and property characterization. Assisted in constructing processing-microstructure relationships that will be used in forensic analysis of actinides.

Undergraduate Researcher

2012-2013

Nga Lee (Sally) Ng Group | Georgia Tech, *Chemical and Biomolecular Engineering*

Collected, monitored, and analyzed data on NO_x and Ozone compounds in urban Atlanta using chemiluminescence analyzers. Maintained hardware instrumentation.

PUBLICATIONS

Maximilian Nguyen, Ari Freedman, Matthew Cheung, Chadi Saad-Roy, Baltazar Espinoza, Bryan Grenfell, Simon Levin, "The complex interplay between risk tolerance and the spread of infectious diseases." *Journal of the Royal Society Interface (in revision)* (2024)

Maximilian Nguyen, "Upper Bounds on Overshoot in SIR Models with Nonlinear Incidence." *npj Complexity* (2024)

Maximilian Nguyen, Ari Freedman, Sinan Ozbay, Simon Levin, "Fundamental Bound on Epidemic Overshoot in the SIR Model." *Journal of the Royal Society Interface* (2023)

Sinan Ozbay and **Maximilian Nguyen**. "Parameterizing network graph heterogeneity using a modified Weibull distribution." *Applied Network Science* (2023).

Sinan Ozbay, Bjarke Nielsen, **Maximilian Nguyen**, "Bifurcations in the Herd Immunity Threshold for Discrete-time Models of Epidemic Spread." *arXiv:2212.06995, under review* (2022).

Debra Van Egeren*, Baransel Kamaz, Shichen Liu, **Maximilian Nguyen**, Christopher R Reilly, Maria Kalyva, Daniel J DeAngelo, Ilene Galinsky, Martha Wadleigh, Eric S Winer, Marlise R Luskin, Richard M Stone, Jacqueline S Garcia, Gabriela S Hobbs, Franziska Michor, Isidro Cortes-Ciriano, Ann Mullally, Sahand Hormoz, "Transcriptional differences between JAK2-V617F and wild-type bone marrow cells in patients with myeloproliferative neoplasms." *Experimental Hematology* (2022).

Shichen Liu, **Maximilian Nguyen**, Sahand Hormoz., "Integrating readout of somatic mutations in individual cells with single-cell transcriptional profiling." *STAR Protocols* (2021)

Debra Van Egeren*, Javier Escabi*, **Maximilian Nguyen***, Shichen Liu, Christopher R Reilly, Sachin Patel, Baransel Kamaz, Maria Kalyva, Daniel J DeAngelo, Ilene Galinsky, Martha Wadleigh, Eric S Winer, Marlise R Luskin, Richard M Stone, Jacqueline S Garcia, Gabriela S Hobbs, Fernando D Camargo, Franziska Michor, Ann Mullally, Isidro Cortes-Ciriano, Sahand Hormoz, "Reconstructing the lineage histories and differentiation trajectories of individual cancer cells in JAK2-mutant myeloproliferative neoplasms." *Cell Stem Cell* (2021). **equal contribution*

Mario U Gaimann, **Maximilian Nguyen**, Jonathan Desponds, Andreas Mayer., "Early life imprints the hierarchy of T cell clone sizes." *elife* (2020)

Debra Van Egeren*, Javier Escabi*, **Maximilian Nguyen***, Shichen Liu, Christopher R Reilly, Sachin Patel, Baransel Kamaz, Maria Kalyva, Daniel J DeAngelo, Ilene Galinsky, Martha Wadleigh, Eric S Winer, Marlise R Luskin, Richard M Stone, Jacqueline S Garcia, Gabriela S Hobbs, Fernando D Camargo, Franziska Michor, Ann Mullally, Isidro Cortes-Ciriano, Sahand Hormoz, " Reconstructing the Lineage Histories and Differentiation Trajectories of Individual Hematopoietic Stem Cells in JAK2-Mutant Myeloproliferative Neoplasms." *Blood* (2020). **equal contribution*

Sarah Bowling, Duluxan Sritharan, Fernando G Osorio, **Maximilian Nguyen**, Priscilla Cheung, Alejo Rodriguez-Fraticelli, Sachin Patel, Wei-Chien Yuan, Yuko Fujiwara, Bin E Li, Stuart H Orkin, Sahand Hormoz, Fernando D Camargo, "An engineered CRISPR/Cas9 mouse line for simultaneous readout of lineage histories and gene expression profiles in single cells." *Cell*, 181(6), 1410-1422 (2020)

John W Biddle, **Maximilian Nguyen**, Jeremy Gunawardena, "Negative reciprocity, not ordered assembly, underlies the interaction of Sox2 and Oct4 on DNA." *eLife*, e41017 (2019)

Maximilian Nguyen, "Towards the Design of an oligoTEA Endosomal Escape Agent: Investigations in Hydrophobicity and pKa." Master's Thesis (2018)

Jessica L Linville, Yanwen Shen, Robin P Schoene, **Maximilian Nguyen**, Meltem Urgun-Demirtas, Seth W Snyder, "Impact of trace element additives on anaerobic digestion of sewage sludge with in-situ carbon dioxide sequestration." *Process Biochemistry*, 51(9), 1283-1289 (2016)

ACADEMIC PRESENTATIONS	<p>IDM Annual Symposium:</p> <p>Global public health in a chaotic world: The role of modeling & data science 2024 Bill and Melinda Gates Foundation, Seattle, WA Poster: "The complex interplay between risk tolerance and the spread of infectious diseases"</p> <p>AMS Spring Eastern Sectional Meeting 2024 American Mathematical Society, Washington DC. Session: <i>Special Session on Mathematics of Infectious Diseases: A Session in Memory of Dr. Abdul-Aziz Yakubu</i> Talk: "Fundamental Bound on Epidemic Overshoot in the SIR Model"</p> <p>APS March Meeting 2024 American Physical Society, Minneapolis. Session: <i>Statistical and Nonlinear Physics</i> Talk: "Fundamental Bound on Epidemic Overshoot in the SIR Model"</p> <p>Contagion on Complex Social Systems Workshop 2023 University of Vermont Talk: "Fundamental Bound on Epidemic Overshoot in the SIR Model"</p> <p>NSF RP3: Research for Pandemic Preparedness Workshop 2023 Poster: "Fundamental Bound on Epidemic Overshoot in the SIR Model"</p> <p>APS March Meeting 2023 American Physical Society, Las Vegas. Session: <i>Statistical Physics of Networks</i> Talk: "Bifurcations in the Herd Immunity Threshold for Discrete-time Models of Epidemic Spread"</p>
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NSF Expeditions Journal Club	2023
University of Virginia, Global Pervasive Computational Epidemiology	
Talk: "Parameterizing Network Heterogeneity: With a Test Application on the Herd Immunity Threshold"	
QCB Colloquium	2023
Princeton University, Lewis-Sigler Institute	
Talk: "Fundamental Bound on Epidemic Overshoot in the SIR Model"	
Lewis-Sigler Institute Retreat	2022
Princeton University, Lewis-Sigler Institute	
Poster: "Unraveling the In-Between of Epidemics on Networks"	
QCB Colloquium	2022
Princeton University, Lewis-Sigler Institute	
Talk: "Using Network Curvature to Analyze Epidemic Spreading"	
NSF Expeditions Meeting	2021
University of Virginia, Biocomplexity Institute and Initiative	
Poster: Uncovering How Social Heterogeneity Shapes Infection Dynamics	
QCB Colloquium	2021
Princeton University, Lewis-Sigler Institute	
Talk: "Reconstructing the lineage histories and differentiation trajectories of individual cancer cells in JAK2-mutant myeloproliferative neoplasms"	
Theoretical Ecology Lab Tea Seminar	2021
Princeton University, Ecology and Evolutionary Biology	
Talk: "Reconstructing the lineage histories and differentiation trajectories of individual cancer cells in JAK2-mutant myeloproliferative neoplasms"	
NSF Expeditions Meeting	2020
University of Virginia, Biocomplexity Institute and Initiative	
Talk: "Model Resolution Effects on Herd Immunity"	
Sensing Chemical Spaces Conference	2019
Princeton University, Princeton Center for Theoretical Science	
Poster: "Rectifying Sampling Effects in Power-law Parameter Estimation"	
The Future of Quantitative Biology Symposium	2019
Harvard University, NSF-Simons Center for the Mathematical and Statistical Analysis of Biology	
Poster: "Reciprocity: A Functional Measure of Coupled Transcription Factor Binding"	

**TEACHING
EXPERIENCE**

Assistant Instructor	2022
<i>Princeton University, Department of Operations Research and Financial Engineering</i>	
Networks (ORF 387)	
Course assistant for an undergraduate elective course on network science. Responsible for teaching precepts, running office hours, proofreading homework and exam problems, grading homework and exams, reviewing projects, and providing feedback.	
Assistant Instructor	2022
<i>Princeton University, Department of Mathematics</i>	
Networks (ORF 387)	
Course assistant for an undergraduate elective course on network science. Responsible for teaching precepts, running office hours, proofreading homework and exam problems, grading homework and exams, reviewing projects, and providing feedback.	

Laboratory Instructor 2021

Princeton University, Integrated Science Program

An Integrated, Quantitative Introduction to the Natural Sciences (ISC 231)
Co-supervised laboratory activities for two classes of freshman students at the intersection of physics, biology, and computer science. Provided feedback to students for the development of scientific writing and assessed laboratory reports.

Instructor 2021

Garden State Youth Correctional Facility

Basic Algebra

Co-taught introductory college algebra course to classroom of incarcerated individuals. Responsible for designing and compiling course material, teaching lectures, administering tests, and providing assignment feedback.

Laboratory Instructor 2014

Georgia Tech, Department of Physics

Introductory Physics 1 - Mechanics (Phys 2211)

Supervised laboratory activities, while teaching and strengthening core physics concepts for undergraduates. Maintained laboratory equipment and inventory and provided assignment feedback.

PROFESSIONAL SOCIETIES American Physical Society, American Mathematical Society, American Institute of Chemical Engineers

ACADEMIC SERVICE

Peer Reviewer

PNAS Nexus, Mathematical Biosciences, Neural Networks

Volunteered to peer-review articles for publication in academic journals.

Journal Club Panelist

2022-Present

Proceedings of the National Academy of Science

Responsible for following and keeping abreast of latest scientific literature in the areas of biophysics and computational biology and making selections for recent important, timely journal articles that lead to short news stories at PNAS.

Seminar Series Organizer

2021-2022

Princeton University, Theoretical Ecology Lab Tea Seminar Series

Co-lead seminar series in Princeton University's Ecology and Evolutionary Biology on topics related to theoretical ecology, theoretical biology, environmental science, and quantitative social science. Responsible for inviting speakers, running and moderating seminars, and maintaining website.

LEADERSHIP ACTIVITIES

Peer Mentor Program Organizer

2022-Present

Princeton University Quantitative and Computational Biology Program

Organized the peer mentoring program for my academic department, where the goal is to facilitate interactions and information exchange between new and more senior students. Organized the social mixer to start the process and also led the mentor-mentee matching process.

Resident Graduate Student

2022-Present

Princeton University, New College West

Student leader within the undergraduate residential college. Responsible for organizing social, academic, and intellectual programming for undergraduate students. Provided support and mentorship for students in freshman residential experience group.

Master's Student Representative

2015-2016

Cornell University ChemE Graduate Student Association (ChEGSA)

Served as the liaison between the ChESGA council and broader MS/MEng chemical engineering population. Worked on social, outreach, and educational programs to improve the chemical

engineering graduate student community.

Ambassador 2012-2014

Georgia Tech Student Health Services (SHS)

Served as an information liaison between the campus health center and the student population by promoting awareness of health issues to the student body. Volunteered at events within the health clinic (i.e. blood drives, flu clinics, etc.).

Recreational Chair 2011-2012

Georgia Tech MPH Hall Council

Served on the residential area executive officer board that organized activities for three hundred student residents. Managed the recruiting and administrative responsibilities of the recreational teams and planned athletic events.

**PEOPLE
MENTORED**

Sinan Ozbay 2022-2023

Then: Graduate Student at Princeton University

Now: PhD Student at Duke

Shichen (Sean) Liu 2018-2019

Then: Research Technician at Dana-Farber Cancer Institute

Now: PhD Student at Caltech

Anthony Henriquez 2018-2019

Then: Undergraduate Student at Harvard University

Now: Software Engineer at Bio-Rad
