Alexander J. Gates

CONTACT INFORMATION

School of Data Science
University of Virginia
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E-mail: agates@virginia.edu
Google Scholar Profile
ORCID Profile

ACADEMIC POSITIONS

University of Virginia
School of Data Science

- Assistant Professor of Data Science — 2022 to present

Northeastern University

- Affiliated Researcher, Network Science Institute — 2021 to 2024
- Associate Research Scientist, Department of Sociology — 2021 to 2022
- Associate Research Scientist, Network Science Institute — 2019 to 2021
- Post-doctoral Research Associate, Network Science Institute — 2017 to 2019

EDUCATION

Ph.D. *Informatics (Networks & Complex Systems)* joint with *Cognitive Science* — May 2017
Indiana University (Bloomington, Indiana, USA)

- Thesis topic: Anatomical and Effective Structure of Complex Systems
- Advisers: Professors Yong-Yeol Ahn, Randall D. Beer, Luis M. Rocha

M.Sc. with distinction: *Mathematical Modelling for Complex Systems* — January 2012
King's College London (London, United Kingdom)

B.A. *Mathematics* — May 2009
Cornell University (Ithaca, New York, USA)

OVERVIEW

$1,738,500 Total Grant Funding as PI or Co-PI
. **$759,500** Gates Share

23 Peer Reviewed Publications

Associate Editor, *EPJ Data Science*

PUBLICATIONS

†: equal contribution; *: corresponding author

Peer Reviewed

J23. **Gates, A.J.**, Nelson, L., Grudt, R. & Zippel, K.* (2025) From Funding Equity Initiatives to Research Productivity: Quantifying the Impact of NSF ADVANCE Awards on Recipients' Publication Trajectories. **Socius: Sociological Research for a Dynamic World**. 11 DOI

J22. Halma, M.T.J., Kumar, S., van Eck, J., Abeln, S., **Gates, A.J.*** & Wuite, G.J.L.* (2025) FAIR data for optical tweezers experiments. **Biophysical Journal** DOI

J21. Charpignon, M.L., Matos, J., Nakayama, L., Gallifant, J., Alfonso, P.G.I., Cobanaj,

M., Fiske, A., **Gates, A.J.**, Ho, F.D.V., Jain, U., Kashkooli, M., McCoy, L.G., Shaffer, J., Woite, N.L. & Celi, L.A.* (2025) Diversity in the medical research ecosystem: a descriptive scientometric analysis of over 49,000 studies and 150,000 authors published in high-impact medical journals between 2007 and 2022. **British Medical Journal Open (BMJ Open)** 15:e086982 DOI PMC10984076

J20. Perrin, P.B.*, West, S.J., Klyce, D.W., Clark, S.W., Vargas, T.A., **Gates, A.J.**, Henry, T.R., Dini, M.E., Agtarap, S.D., Eagye, C.B., Finn, J.A., Juengst, S.B., Dams-O'Connor, K., & Bombardier, C.H. (2024). Psychometric network analysis in rehabilitation research: A methodological demonstration in depression symptoms of veterans and service members at 1 and 2 years after TBI. **Rehabilitation Psychology**. 69(4), 347–356 DOI

🏆 Awarded the Traumatic Brain Injury Model Systems **Rosenthal Award (2025)** based on "importance, technical quality, and writing quality"

J19. Shekhtman, L.M. **Gates, A.J.** & Barabasi, A.-L.* (2024) Mapping philanthropic support of US science. **Scientific Reports** 14, 9397. DOI

J18. **Gates, A.J.**†, Gold, J.R.†, Nelson, L.K.* & Zippel, K. (2024) Translating interdisciplinary knowledge for gender equity: quantifying the impact of NSF ADVANCE. **Social Science Quarterly** 105:342–358. DOI

Code: **Github**

J17. Ke, Q., **Gates, A.J.** & Barabasi, A.-L.* (2023) A network normalized impact measure reveals successful periods of scientific discovery across discipline. **Proc. Natl. Acad. Sci. USA (PNAS)** 120, 48 e2309378120 (cover story, see M6) DOI

Code: **Github**

J16. Herrera-Guzmán, Y., **Gates, A.J.**, Candia, C. & Barabasi, A.-L.* (2023) Quantifying hierarchy and prestige in US ballet academies as social predictors of career success. **Scientific Reports** 13, 18594 DOI

Data: Zenodo

J15. **Gates, A.J.*** & Barabasi, A.-L. (2023) Reproducible science of science at scale: pySciSci. **Quantitative Science Studies**, 4 (3): 700–710. DOI

Code on: **Github**

J14. Gold, J.†, **Gates, A.J.**†, Arefinul, S., Melson, M., Nelson, L.K. & Zippel, K.* (2022) The NSF ADVANCE network of organizations. **ADVANCE Journal** 3 (1) DOI

J13. **Gates, A.J.***, Correia, R.B., Wang, X., & Rocha, L.M.* (2021) The effective graph reveals redundancy, canalization, and control pathways in biochemical regulation and signaling. **Proc. Natl. Acad. Sci. USA (PNAS)** 118 (12), e2022598118 (cover story, see M4) DOI

Code: **Github**

J12. **Gates, A.J.**†, Gysi, D.M.†, Kellis, M. & Barabasi, A.-L.* (2021) A wealth of discovery built on the Human Genome Project–by the numbers. **Nature** 590, 212-215 (cover story, see M3) DOI

J11. Huang, J.†, **Gates, A.J.**†, Sinatra, R. & Barabasi, A.-L.* (2020) Historical comparison of gender inequality in scientific careers across countries and disciplines. **Proc. Natl. Acad. Sci. USA (PNAS)** 117 (9), 4609-4616 DOI

J10. **Gates, A.J.**, Ke, Q., Varol, O. & Barabasi, A.-L.* (2019) Nature's reach: narrow work has broad impact. **Nature** 575, 32-34 (cover story, see M1) DOI

J9. **Gates, A.J.***, Wood, I.B., Hetrick, W.P & Ahn, Y.-Y.* (2019) Element-centric clustering comparison unifies overlaps and hierarchy. **Scientific Reports** 9, 8574 DOI

Code: **Github**

J8. **Gates, A.J.*** & Ahn, Y.-Y.* (2019) CluSim: a python package for calculating clustering similarity. **Journal of Open Source Software** 4, 1264 DOI

Code: **Github**

J7. Correia, R.B., **Gates, A.J.**, Wang, X. & Rocha, L.M.* (2018) CANA: A Python Package for Quantifying Control and Canalization in Boolean Networks. **Frontiers in Physiology** 9, 1046 DOI
Code: **Github**

J6. **Gates, A.J.*** & Ahn, Y.-Y.* (2017) Impact of Random Models on Clustering Similarity. **Journal of Machine Learning Research** 18, 1-28 DOI
Code: **Github**

J5. Agmon, E., **Gates, A.J.** & Beer, R.D.* (2016) The structure of ontogenies in a model protocell. **Artificial life** 22, 1-19 DOI

J4. Agmon, E., **Gates, A.J.**, Churavy, V. & Beer, R.D.* (2016) Exploring the space of viable configurations in a model of metabolism-boundary co-construction. **Artificial life** 22, 153-171 DOI

J3. **Gates, A.J.*** & Rocha, L.M.* (2016) Control of complex networks requires both structure and dynamics. **Scientific Reports** 6, 24456 DOI
Code: **Github**

J2. Kolchinsky, A., **Gates, A.J.** & Rocha, L.M.* (2015) Modularity and the spread of perturbations in complex dynamical systems. **Physical Review E** 92, 060801 DOI
Code: **Github**

J1. Das, S., **Gates, A.J.**, Abdu, H.A., Rose, G.S., Picconatto, C.A. & Ellenbogen, J.C.* (2007) Designs for ultra-tiny, special-purpose nanoelectronic circuits. **IEEE: Circuits and Systems I**, 54, 2528-2540 DOI

Peer Reviewed Conference Proceedings

C3. Agmon, E., **Gates, A.J.** & Beer, R.D.* (2015) Ontogeny and adaptivity in a model protocell. **Proceedings of the European Conference on Artificial Life (ECAL'15)**. 216-223. York, UK.

C2. Agmon, E., **Gates, A.J.**, Churavy, V. & Beer, R.D.* (2014) Quantifying robustness in a spatial model of metabolism-boundary co-construction. **Proceedings of the International Conference on Artificial Life (ALife'14)**. 514-521. NYC, USA.

C1. **Gates, A.J.** & Rocha, L.M.* (2014) Structure and dynamics affect the controllability of complex systems: a preliminary study. **Proceedings of the International Conference on Artificial Life (ALife'14)**. 429-430. NYC, USA.

Book Chapters

B1. Wang, X., **Gates, A.J.** & Barabasi, A.-L.* (2023) An overview of the science of success. In: T. Yasseri (Ed.), **Handbook of Computational Social Science**. Edward Elgar Publishing Ltd. **SocArxiv**

Other Published Works

O3. **Gates, A.J.**, Ke, Q. & Barabasi, A.-L.* (2024) Reply to Vaccario et al.: The Role of Baselines in Fair and Unbiased Citation Metric Evaluation. **Proc. Natl. Acad. Sci. USA (PNAS)** 121 (41) e2410675121 DOI

O2. **Gates, A.J.** (2023) Disruptive Discoveries in Decline: How Data is Helping us Understand the Changing Landscape of Scientific Progress. **UVA Data Science Newsletter**

O1. Macdonald, B. & **Gates, A.J.** (2020) Experts' Commentary: The Soccer Team Problem. **The UMAP Journal** 41(3): 257-260

Policy Contributions

PC1. Brown, D. & Gates, A. (2025) Response to NSF Request for Information: Request for Information on Key Technology Focus Areas for the National Science Foundation's Directorate for Technology, Innovation and Partnerships, July 2025.

Multimedia Projects

M1. **Nature 150th anniversary** 2019

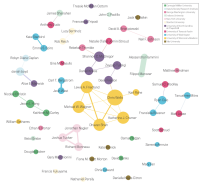
Depicting the interconnected history of a scientific journal.

1) Cover visualization
2) Animated movie
3) 3D interactive network visualization

🏆 **Awards**: 2020 Webby Award; 2020 Peoples Voice Webby Award; Fast Company's 2020 Innovation by Design finalist in the Data Design category; 2020 European Design Gold Medal; Places & Spaces featured work; Ludwig Museum: Hidden Patterns featured work

M2. **Knight Research Network Assessment** 2021-23

Visualization and analysis of the Knight Research Network (KRN).



2021 Network visualizations and analysis (pages 13-16)
2022 Network visualizations and analysis (pages 15-17)
2023 (in prep.) Network visualizations and analysis (pages)

M3. **Impact of the Human Genome Project** 2021

Visualization and analysis of scientific attention to the Human Genome.

1) Cover visualization
2) Animated movie

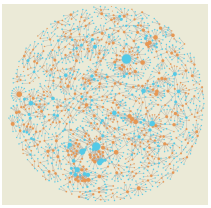
M4. **Biochemical network visualization** 2021

Visualization and analysis of biochemical singalling networks.

Cover visualization

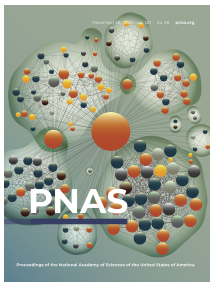
M5. **ADVANCE Co-Authorship Network: Interactive Visualization** 2022

Visualization and analysis of co-authorship networks extracted from NSF ADVANCE outcome publications.



1) Interactive visualization
2) Animated movie

M6. **Network-normalized impact network visualization** 2023
Visualization and analysis of co-citation networks.



Cover visualization

WORK IN SUBMISSION

S7. Qiu, J., Levinson, C.A., Kropko, J.M., Henry, T.R.* & **Gates, A.J.*** (in prep.) The Extended Community of Diet Culture Around Eating Disorders: A Network Analysis of Reddit Forums

S6. Lauterwasser, S., Nelson, L.K., Gold, J.R., **Gates, A.J.** & Zippel, K.* (in sub.) What gets lost in translation? Epistemic tensions between translation and diffusion in practice-oriented scholarship

S5. **Gates, A.J.***, Mane, I. & Gao, J. (in sub.) The increasing fragmentation of global science limits the diffusion of ideas. **arxiv** 2404.05861 Code: **Github**

S4. Johnson, T., **Gates, A.J.**, Bourne, P.E.* (in sub.) A Cap and Trade Model to Address the Biological Data Sustainability Paradox

S3. Zhou, R., Wan, G., Gabriel, S., Li, S., **Gates, A.J.**, Sap, M., Hartvigsen, T.* (in sub.) Evaluating Dialectal Reasoning Bias in Language Models Against African American English

S2. Wang, X., **Gates, A.J.**, Resch, M. & Barabasi, A.-L.* (in sub.) Quantifying institutional gender inequality in contemporary visual art. **arxiv** 2506.22103
Code: **Github** Data: **Dataverse**

S1. Perrin, P.B.*, Christ, B. R.,Vargas, T.A., Dini, M.E., Ertman, B., Cull, S., Rivera, D., Xia, B., Andrews, E.E., Mona, L., **Gates, A.J.**, & Klyce, D.W. (in sub.) The Internalized Ableism Inventory (IAI): Scale Development Using a Hybrid Artificial Intelligence and Community-Based Participatory Research Design. **preprint**

WORK IN PROGRESS

P9. Gao, J., Wang, Y. & **Gates, A.J.*** (in prep.) Who gets seen? Nationality bias in international art exhibitions

P8. Altenburger, B., Gao, J. & **Gates, A.J.*** (in prep.) Bridging Disciplines, Building Prestige: How Interdisciplinary Collaboration Elevates Academic Departments

P7. Gao, J. & **Gates, A.J.*** (in prep.) Self-Citation and National Research Systems: A Path to Independence or Isolation?

P6. Fraser, T., & **Gates, A.J.**, Nelson, L., Zippel, K.* (in sub.) Bottom-up or Top-Down? Bridging academics in the ADVANCE network for gender equity

P5. Misiorek, T., Gao, J. & **Gates, A.J.*** (in prep.) The diversity of philanthropic boards and diffusion of scientific policy

P4. Yuk, B., Shekhtman, L.M. & **Gates, A.J.*** (in prep.) Returners and Explorers in Philanthropic Grants

P3. Shekhtman, L.M., Barabasi, A.-L. & **Gates, A.J.*** (in prep.) A New Network Dataset of US Philanthropic Grants

P2. **Gates, A.J.*** (in prep.) Element-centric similarity facilitates comparing clusterings and communities when element sets differ

P1. Levine, C., Barabasi, A.-L. & **Gates, A.J.*** (in prep.) Quantifying the influence of prestige and peer effects on Army officer careers

Research Grants as PI or Co-PI

$350,000 National Science Foundation (NSF) Science of Science2025-2030 Collaborative Research: Collaboration Front and Center: Evaluating Interdisciplinary Networks in Research Institutes (budget slashed from $620,000)
PI: **Alexander Gates** (Gates share: $150,000)
Co-PIs: Dakota Murray (Northeastern) & Alina Lungeanu (Northeastern)

$55,000 Vice President of Research, UVA 2025-2026
Enhancing Research Analytics at UVA
PI: **Alexander Gates**

$900,000 Department of Energy (DOE) 2025-2028
National Nuclear Security Administration (NNSA) No. DE-FOA-0003242
Artificial Intelligence-guided Experiments to Discover Structure-Property-Performance Linkages in Multiphase Heterogeneous Energetic Compounds
Co-PIs: Steve Baek & H.S. Udaykumar (U. Iowa) & **Alexander Gates** (Gates share: $300,000)

$75,000 Rapid Science & Coalition for Aligning Science 2025-2026
Evaluating Open Science for the Aligning Science Across Parkinson's (ASAP) Collaborative Research Network
PI: **Alexander Gates**

$500 Office of Citizen Scholar Development - Kenan Acad. Village Research 2024-2025
Quantifying the Interdisciplinarity of UVA
PI: **Alexander Gates**

$60,000 Provost Special Funds 2022-2025
Evaluating Collaboratory Cultures
Co-PIs: Phil Bourne & **Alexander Gates** (Gates share $30,000)

$298,000 Jefferson Trust 2022-2025
Evaluating Collaboratory Cultures
Co-PIs: Phil Bourne & **Alexander Gates** (Gates share $149,000)

Research Grants as Co-I

$20,000,000 National Security Data and Policy Institute 2024-
Gates Role: Co-I (Co-PIs: Phil Potter, Don Brown & Madhav Marathe)

$1,400,000 National Science Foundation, NSF # 2000713 2020-2023
Innovation Networks: The Creation and Diffusion of Gender Equity Ideas in Universities
Gates Role: Co-I (Co-PIs: Kathrin Zippel & Laura Nelson)

$1,500,000 The Air Force Office of Scientific Research, Minerva Award 2019-2024
Understanding dynamics, predictability, and uncertainties of scientific discovery
Gates Role: Co-I (Co-PIs: Dashun Wang, Brian Uzzi, Benjamin Jones, Luis Amaral, James A. Evans, Santo Fortunato & Albert-Laszlo Barabasi)

$2,000,000 Templeton Foundation 2018-2021
Using Big Data to Quantify & Cultivate Genius
Gates Role: Co-I (PI: Albert-Laszlo Barabasi)

Event Grants

$5,000 UVA DEI Initiatives 2024-2025
Belonging Beats: Fostering Inclusivity
Co-PIs: Julide Etem, JoVia Armstrong, Josh Thorud & **Alexander Gates**

$5,000 Network and Graph Data Research Interest Group 2024-2025
PI: **Alexander Gates**

Grants in Submission

In Submission: $600,000 Army Research Institute **$750,000** 2025-2027
Deciphering the Talent Mosaic: data-driven assessment of officer talent and unit-specific potential in the US Army using complex networks
PIs: **Alexander Gates** (Gates share: $450,000), Charles Levine (LTC US Army, West Point), Dakota Murray (Northeastern), & Kate Coronges (Northeastern)

Unfunded Grant Submissions

Not funded: $600,000 NSF Cyberinfra. for Sustained Scientific Innovation 2025-2028
Elements: Supporting the science of science through higher-order network analysis at scale
Co-PIs: Nicholas Landry (UVA) & **Alexander Gates**

Not funded: $450,000 UVA Grand Challenges in Precision Health 2025 *Precision Health for University Student Substance Use: Integrating Advanced Data Science Methods To Identify Targeted Interventions to Improve Health and Academic Performance*
PI: Christopher Holstege (UVA)
Co-PIs: Rita Farah (UVA), Andrew Taylor (UVA), Alexander Gates, Nassima Ait-Daoud Tiouririne (UVA)

Not funded: $627,787 NSF CAREER: Science of Science 2024
CAREER: Quantifying the Influence of Academic Leadership on US Science
PI: **Alexander Gates**

Not funded: $700,000 OpenAI SuperAlignment 2024
Analyzing and Mitigating Misalignment Propagation in Advanced AI Models: A Framework for Bias Detection and Intervention
Co-PIs: **Alexander Gates** & Tom Hartvigsen (UVA)

Not funded: $1,694,800 U.S. Dep. of Education, Institute of Education Sciences 2023
IES Algebra Readiness
PI: Tara Hofkens (UVA)
Co-PIs: **Alexander Gates** & Brian Wright

Not funded: $7,500,000 U.S. DOD - Navy - Office Of Naval Research (Onr) 2023
Modeling and Understanding of Complex Interventions on Large and Complex Networks
PI: Sheng Li (UVA)
Co-PIs: Jundong Li (UVA), **Alexander Gates**, Amarda Shehu (GMU)Adong Zhang (UVA) & Tim Weninger (Notre Dame)

Not funded: $622,172 NSF CAREER: Science of Science 2023
CAREER: Quantifying the Influence of Academic Leadership on US Science
PI: **Alexander Gates**

Not funded: $400,000 NSF APTO-Assess-Predict Tech Outcomes 2023 *Evaluating the Effectiveness of U.S. Research and Development: Portfolio analysis of funding for innovation*
PI: **Alexander Gates** & Terence Johnson (UVA)

Not funded: $806,955 NSF Science of Science 2023 *Quantifying the Impact of Academic Leadership on US Science*
PI: **Alexander Gates**

Presentations

Invited Talks

T10. Quantitative Collective (Political Science & Economics), University of Virginia 04/2025
"The increasing fragmentation of global science limits the diffusion of ideas"

T9. Biomedical Engineering Seminar Series, University of Virginia 03/2025
"Redundancy and fragmentation in biological & social networks"

T8. Darden-SDS joint Seminar Series, University of Virginia 02/2024
"The increasing fragmentation of global science limits the diffusion of ideas"

T7. Northwestern Institute on Complex Systems, Northwestern University 09/2023
"Beyond Core-Periphery: Uncovering the Impacts of Scientific Networks on Resources and Recognition"

T6. Data Science Institute, Universidad del Desarrollo, Chile 09/2023
"Beyond Core-Periphery: Uncovering the Impacts of Scientific Networks on Resources and Recognition"

T5. Carolina Network for Network and Data Science, University of North Carolina 2023
"Structural Patterns Underlying Scientific Funding and International Recognition"

T4. National Science Foundation: ADVANCE Seminar, NSF, Alexandria VA 03/2023
"Mapping interdisciplinary knowledge production from the NSF ADVANCE program"

T3. Life Science Across the Globe (LSAG), Howard Hughes Medical Institute 07/2022
"The importance of data for Gender Policy in Science", Gender Policies in Science, Recording here

T2. NetSci-X 5th Intl. Conference and School on Network Science, University of Tokyo, Japan 01/2020
"How to find Network Communities and what to do with them"

T1. Network Resiliency, University of Oklahoma 04/2018
"Visual analytics for network resilience", Recording here

Contributed Talks

- Sunbelt: International Conference on Social Network Analysis 06/2025 (Paris, France)
- 20th International Conference on Scientometrics & Informetrics 06/2025 (Yevenan, Armenia)
- Sunbelt: International Conference on Social Network Analysis 06/2024 (Edinburgh, Scotland)
- NetSci: International Conference on Network Science (Quebec City, Canada) 06/2024
- OpenAlex User Meeting (Virtual) 05/2024
- IC2S2: International Conference on Computational Social Science 07/2023 (Copenhagen, Denmark) "Quantifying Systemic Gender Inequality in Visual Art"
- IC2S2: International Conference on Computational Social Science 07/2023 (Copenhagen, Denmark) "Connected Reality: Virtual Immersion in Social Networks"
- NetSci: International Conference on Network Science (Vienna, Austria) 07/2023 "Mapping Philanthropic Support of Science"
- ComplNet: Complex Networks 2020 (Madrid, Spain) 12/2020 "The effective graph reveals redundancy, canalization, and control pathways in biochemical regulation and signaling"
- NetSci: International Conference on Network Science (Burlington, VT) 07/2019 "The effective graph captures canalizing dynamics and control in Boolean network models of biochemical regulation"

- International Conference on Network Science (Indianapolis, IN) 07/2017
  "On comparing clusterings: an element-centric framework unifies overlaps and hierarchy"
- Advanced Computational Neuroscience Network (Ann Arbor, MI) 03/2016
  "Comparing the multi-scale structure of human connectomes"
- CCS: Conference on Complex Systems (Tempe, AZ) 09/2015
  "Control of complex networks requires structure and dynamics"
- ALife: International Conference on Artificial Life (New York, NY) 07/2014
  "Structure and dynamics affect the controllability of complex systems: a preliminary study"
- Workshop on Very Small Robots (McLean, VA) 05/2005
  "Designs for ultra-tiny, special-purpose nanoelectronic circuits"

Invited Discussant

- Japanese Politics Online Seminar Series (JPOSS), Harvard University 10/2023
  Discussant "Career Trajectory of Political Scientists' Publication in the First and Second Language"

Research Seminars

- Quantitative Psychology Group, University of Virginia 11/2023
  "Beyond Core-Periphery: Uncovering the Impacts of Scientific Networks on Resources and Recognition"
- Social Psychology Group, University of Virginia 09/2023
  "Beyond Core-Periphery: Uncovering the Impacts of Scientific Networks on Resources and Recognition"
- NetSci Speaker Series, Northeastern University 11/2020
  "Quantifying the impact of systemic bias on careers: gender differences in science & art"
- NetSci Research Roundtable, Northeastern University 02/2019
  "Communities and bias in complex networks"
- Cognitive Lunch Seminar, Indiana University Bloomington 10/2016
  "Comparing overlapping and hierarchically structured clusterings with applications to the multi-scale structure of human connectomes"
- Cognitive Lunch Seminar, Indiana University Bloomington 04/2015
  "Complex systems approaches in cognitive science"
- CASCI Group Seminar, Indiana University Bloomington 03/2013
  "Controllability, structure, and dynamics for Boolean regulatory networks"
- The Mathematics Graduate Seminar, Indiana University Bloomington 04/2012
  "Mathematical problems in complexity"

Workshops

Datathon 4 Justice	2021
Science of Science Summer School	2021
Complex Networks Winter Workshop	2021
Summer School on Stat. Inference & Info. Theory in Complex Systems	2012

Teaching

Instructor of Record, University of Virginia

DS4002 Data Science Project	Fall 2024
DS8104 Network Science	Spring 2024
DS8104 Network Science	Spring 2023

Instructor of Record, Indiana University Bloomington

I201 Mathematical Foundations of Informatics — Spring 2017
I201 Mathematical Foundations of Informatics — Fall 2016
I201 Mathematical Foundations of Informatics — Spring 2016
I201 Mathematical Foundations of Informatics — Fall 2015

Associate Instructor, Indiana University Bloomington

I201 Mathematical Foundations of Informatics, Honors — Spring 2012
I201 Mathematical Foundations of Informatics — Fall 2011

Instructor of Record, Cornell University

BTRY 115 Intro To Quantitative Methods — Spring 2009
BTRY 115 Intro To Quantitative Methods — Spring 2008

Teaching Assistant, Cornell University

Math 012 Calculus — Spring 2009
Math 011 Calculus — Fall 2008
Math 012 Calculus — Spring 2008
Math 011 Calculus — Fall 2007
Prefreshman Mathematics Summer Program — Summer 2007

Advising

Mentoring Summary

2 PhD Students - Dissertation Advisor
6 PhD Qualification / Dissertation Committees
7 Master Students
13 Undergraduate Students

Student Successes

3 Publications (J16; J23;)
Betsy Altenburger - Keane Award ($5,500), Outstanding Undergraduate Research

Post-doctoral Mentor

Dr. Jianjian Gao — 2023 - present

PhD Students - Dissertation Advisor

Jiaxing "Joy" Qiu, University of Virginia, USA — 2025-
Dr. Yessica Herrera-Guzmán, Universidad del Desarrollo, Chile — 2021-2023
Charles Levine, Lt. Col. US Army (Ret.), Northeastern University, USA — 2019-present

PhD Students - Dissertation Committee

Jack Beerman, University of Virginia, USA — 2025
Dr. Laura Jamison, University of Virginia, USA — 2024

PhD Students - Qualification

Beau Leblonde, University of Virginia, USA — 2024
Joy Qiu, University of Virginia, USA — 2024
Weili Shi, University of Virginia, USA — 2024
Zach Blanks, University of Virginia, USA — 2023

PhD Students - Project

Beau Leblonde, University of Virginia, USA — 2023-2024
Dr. Xindi Wang, Northeastern University, USA — 2019-2022
Dr. Milan Janosov, Central European University, Hungary — 2019

Masters Students - Honors Thesis

Rachael Grudt, Northeastern University 2020-2021

Masters Students - Project

Indraneel Sunil Mane 2019-2021
Ashutosh Singh, Trevor Pearce 2020
Xinyu Tang, Apoorva Kasoju, Sreejith Sreekumar 2019

Undergraduate Students (13 students)

University of Virginia
Anna Yao (2025), Mohini Gupta (2025), Alka Link (2025), Kaytie Rubio (2025), Isabel Xiao (2024-2025), Olivia Davis (2024-2025), Heba Ahmed (2024-2025), Tiancheng (Sky) Hu (2024), Betsy Altenburger (2023-2025), Ty Misiorek (2023-2025), Bryan Yuk (2023-2024), Tatev Gomtsyan (2023)

Northeastern University
Kristen Flaherty (2019)

Industrial Positions

MITRE

Student Intern in the Nanosystems Group 2006
Student Intern in the Nanosystems Group 2004

Honors

Visualization & Communication

- Capital One Design Fellow, UVA School of Data Science 2023-2024
- Webby Award 2020
- Peoples Voice Webby Award 2020
- Fast Company's Innovation by Design finalist in the Data Design category 2020
- European Design Gold Medal 2020

Conference

- Best Paper, European Conference on Artificial Life (York, UK) 2015
- Best Poster, IGERT Research Showcase (Bloomington, Indiana, USA) 2014
- Best Poster, IGERT Research Showcase (Bloomington, Indiana, USA) 2013
- MITRE Best Technical Paper Runner-Up (McLean, Virginia, USA) 2007
- Semi-Finalist, Intel Science Talent Search 2005
- State Finalist, Junior Science and Humanities (New York, USA) 2005

Scholarship

- Trainee, NSF/IGERT Brain Body Environment, Indiana University 2012-2015
- Thomas J. Watson Scholar, IBM 2005-2009

Service

Editorial Services

- Associate Editor, *EPJ Data Science* 2025-
- Guest Editor, *Proc. Natl. Acad. Sci. U.S.A* (PNAS) 2024

Departmental Services

- *T3 Hiring Committee*, University of Virginia 2023 -
- Chair, *Graph and Network Data RIG*, University of Virginia 2023 -
- *Art & Artifacts Committee*, University of Virginia 2023 -
- Chair, *Data is ART*, University of Virginia 2023 - 2024
- *PhD Systems Curriculum Committee*, University of Virginia 2023 - 2024

- *Undergraduate Design Curriculum Committee*, University of Virginia 2023 - 2024
- *PhD Curriculum Committee*, University of Virginia 2022 -
- *CCNR Journal Club*, Northeastern University 2017-2019
  organize a biweekly meeting of post-docs to discuss recent literature
- *Complex CopyCats*, Indiana University 2013-2016
  founder and lead organizer of this reading group focused on reproducing results from important complexity science papers
- *Graduate Program Committee*, Indiana University 2013-2015
  student representative with focus on curriculum development, degree requirements, and admissions
- *Graduate Informatics Student Association (GISA)*, Indiana University 2013-2015
  co-founder and institutional voice chair

University Services

- UVA Futures Initiative Working Group 2024 -
- UVA Interdisciplinary Research Building Focus Group 2024 - 2025

International Services

- *Interdisciplinary Contest in Modeling* 2019-2021
  An international contest for 20,000 undergraduate students.
  Authored the Network Science Problem ('20), triage grading ('19-'21), final grading ('20-'21), and authored a problem perspective [O1].
  See this article about the 2020 winning team: William & Mary, News & Media.

Conference Organization

- Session Chair, *NetSci 2024* (Quebec, Canada). June 2024
- Session Chair, *International Conference on Computational Social Science* (Copenhagen, Denmark). July 2023
- Session Chair, *NetSci 2023* (Vienna, Austria). July 2023
- Satellite Organizer, *Quantifying Success* (Virtual). July 2021
- Satellite Organizer, *Quantifying Success* (Rome, Italy). September 2020
- Poster Session Co-chair, *CompleNet 2018* (Boston, MA). March 2018

Reviewer

- **Funding**: National Science Foundation (NSF, SoS:DCI, 2019, 2021 & 2022); NSF CISE CRII panel (2022); NSF HNDS panel (2024); NSF Mathematical Biology (2025); City University of Hong Kong Grants (2022); Israel Science Foundation (ISF, 2023); Templeton Foundation (2025)
- **General**: *Proc. Natl. Acad. Sci. U.S.A* (PNAS); *Nature Communications*; *Science Advances*; *Scientific Reports*
- **Data Science**: *Nature Computational Science*; *EPJ Data Science*; *Applied Network Science*; *Transactions on Knowledge Discovery in Data*; *Pattern Recognition*; *Applied Sciences*; *WIRES Computational Statistics*; *Data Mining and Knowledge Discovery*; *Patterns*; *Journal of Classification*
- **Computer Science**: *PeerJ Computer Science*; *Innovations in Theoretical Computer Science Conference (ITCS 2022)*; *IEEE Access*; *IEEE Transactions on Fuzzy Systems*; *Journal of Open Source Software*; *IEEE Signal Processing Letters*; *Engineering Optimization*
- **Social Sciences**: *Nature Human Behavior*; *Quantitative Science Studies*; *Review of Economics and Statistics*; *Intelligent Systems in Accounting, Finance and Management*; *Rehabilitation Psychology*; *Journal of Informatics*
- **Physics**: *Physical Review X*; *Physical Review E*; *Chaos*; *Nature Communications Physics*
- **Computational Biology**: *Nature Neuroscience*; *Proceedings of the Royal Society B*; *Bioinformatics*; *Nucleic Acids Research*; *Artificial Life*; *Animals*

- **Conference Program Committee**: *DSAA 2024*; *Complex Networks and their Applications 2021, 2022, 2023, 2024, 2025*; *NetSci 2020*; *NetSci-X 2020, 2022*; *Complex Networks 2019, 2020*

Media Coverage

Selected interviews

- UVA Data Points Podcast "Surviving the Data Deluge" 02/20/2025
- CBS19 News "Inside the Numbers - Network Science" 05/23/2023
- UVA Data Science News "How Alex Gates Makes the Invisible Visible" 11/17/2022

Selected scientific coverage

- "Professors Baek and Gates Win $900K Award from NNSA to Advance Physics-Informed Machine Learning"
- Shekhtman, L.M. **Gates, A.J.** & Barabasi, A.-L.* (2024) Mapping philanthropic support of US science. **Scientific Reports** 14, 9397. DOI
  Commentaries and Press coverage:
  - **Nature** "How philanthropy can nurture your research"
  - **SDS News** "New Study Explores the World of Philanthropy and Research Funding"
  - **The Conversation** "Philanthropy provides $30B annually for science and health research - funding that tends to stay local"
  - **The Chronicle of Philanthropy** "Grants for Science and Health Research Tend to Stay Local"
- **Gates, A.J.**†, Gold, J.R.†, Nelson, L.K.* & Zippel, K. (2024) Translating interdisciplinary knowledge for gender equity: quantifying the impact of NSF ADVANCE. **Social Science Quarterly** 105:342–358. DOI
  Commentaries and Press coverage:
  - **Work and Family Researchers Network**
- Ke, Q., **Gates, A.J.** & Barabasi, A.-L.* (2023) A network normalized impact measure reveals successful periods of scientific discovery across discipline. **Proc. Natl. Acad. Sci. USA (PNAS)** 120, 48 e2309378120 (cover story, see M6) DOI
  Press coverage:
  - **SDS News** "New Research Demonstrates More Effective Method for Measuring Impact of Scientific Publications"
- Herrera-Guzmán, Y., **Gates, A.J.**, Candia, C. & Barabasi, A.-L.* (2023) Quantifying hierarchy and prestige in US ballet academies as social predictors of career success. **Scientific Reports** 13, 18594 DOI
  Data: Zenodo
  Press coverage:
  - **SDS News** "New Research Uncovers How Hidden Networks Can Predict Success in Ballet"
- **Gates, A.J.***, Correia, R.B., Wang, X., & Rocha, L.M.* (2021) The effective graph reveals redundancy, canalization, and control pathways in biochemical regulation and signaling. **Proc. Natl. Acad. Sci. USA (PNAS)** 118 (12), e2022598118 (cover story, see M4) DOI
  Code on: **Github**
  Commentaries and Press coverage:
  - **PNAS** "Identifying 'more equal than others' edges in diverse biochemical networks"
  - **Gulbenkian Science** "Uncovering the 'master switches' of biochemical networks can explain the effects of drugs in the destruction of cancer cells"
  - **Publico** (in portuguese) "Criado modelo distingue principais interaccoes de genes organismo"
    Reprinted: **SIC Noticias**, **Health News**, **Jornal Economico**, **RTP Noticias**, **Lifestyle ao minuto**, **Destak**, **Sabado**, **Observador**, **Porto Canal - Sapo (Online)**, **Saude Mais tv (online)**
- **Gates, A.J.**†, Gysi, D.M.†, Kellis, M. & Barabasi, A.-L.* (2021) A wealth of discovery built on the Human Genome Project–by the numbers. **Nature** 590, 212-215 (cover story, see M3) DOI
  Press coverage:

- **Mashup MD** "A wealth of discovery built on the Human Genome Project — by the numbers"
- **News Break** "A wealth of discovery built on the Human Genome Project — by the numbers"
- **American Online News** "A Wealth Of Discovery Built On The Human Genome Project — By The Numbers – Nature.Com"

- Huang, J.†, **Gates, A.J.**†, Sinatra, R. & Barabasi, A.-L.* (2020) Historical comparison of gender inequality in scientific careers across countries and disciplines. **Proc. Natl. Acad. Sci. USA (PNAS)** 117 (9), 4609-4616 DOI
  Commentaries and Press coverage:
  - **PNAS** "Do the social roles women and men occupy in science allow equal access to publication?"
  - **Nature Index** "Women rival men in scientific research publications and citations"
  - **Inside Higher Education** "Gender Inequality in Science Careers and Publishing"
  - **Diverse News** "Study: Gender Inequality Persists in Science Careers and Publishing"
  - **Chemical & Engineering News** "Women publish at rates equal to men but leave science earlier"
  - **Drug Target Review** "Gender inequality in STEM publishing due to female dropout rates"
  - **Science Nordic** "Women are not formally discriminated against in Norwegian academia but they still dont become professors"
  - **The Paper** (in chinese)
  - **News@Northeastern** "Do women publish less than men in scientific fields? Turns out, scientists have been asking the wrong question."

- **Gates, A.J.**, Ke, Q., Varol, O. & Barabasi, A.-L.* (2019) Nature's reach: narrow work has broad impact. **Nature** 575, 32-34 (cover story, see M1) DOI
  Press coverage:
  - **Fast Company** "This mesmerizing 3D map visualizes millions of scientific studies"
  - **InfoDocket** "A Network of Science: 150 Years of Nature Papers"
  - **ICMAB** "A network of science: 150 years of Nature papers"
  - **Hungarian Insider** "Hungarian helps Nature magazine celebrate 150th anniversary"
  - **News@Northeastern** "150 years of science in a cosmic web of paper trails"