Krishna Shrinivas

Assistant Professor of Chemical and Biological Engineering, Northwestern University

BlueSky | Email | Website | Google Scholar | updated jan 1 25

Current positions

Asst. Professor of

Chemical and Biological Engineering, Northwestern University, and
Cell and Developmental Biology, Feinberg Medical School, Northwestern, and
(by courtesy) Engineering Science and Applied Math, Northwestern University

Core Member, Center for Synthetic Biology, Northwestern University
Member, NSF-Simons National Institute of Theory and Math in Biology

Feb 2024 - now, Evanston IL USA

Education

PhD & MS in Practice, Chemical Engineering, Massachusetts Institute of Technology

September 2014 - August 2020

B.Tech (Honors), Chemical Engineering, IIT-Madras

Sept 2010 - Jul 2014, Minor in Theoretical Chemistry

Experience

NSF-Simons Quantitative Bio Fellow, Harvard University

Independent postdoctoral fellowship, Sept 2020 - Jan 2024, Cambridge MA USA

Whitman Center Associate & Physiology Trainee, Marine Biological Laboratories
Visiting researcher, Gladfelter Lab

July 2023, 2022 & June-July 2021, Woods Hole, USA

March 2022, UNC-Chapel Hill

Consulting Scientist,

Merck, April 2016 - May 2016, Ballydine, Ireland

Cenovus Energy, Jan 2016 - Feb 2016, Calgary, Canada

Honors, Awards, and Fellowships

NSF-Simons Fellowship, Harvard University, *Sept. 2020 - Jan 2024*
~$350K over 3+ years for supporting independent postdoctoral research

Research Grant, Marine Biological Laboratories, *March 2022*
~$2k funding to facilitate collaborative research at Gladfelter Lab

ELBE fellowship, *December 2019* (declined for NSF-Simons Fellowship)

Edward W. Merrill Outstanding Teaching Assistant Award, MIT *May 2018*
Student nominated award for best TA across Chemical Engineering

MITSCEP 1936 Course Xa Fellowship, MIT, *2014 - 2015*

Institute silver medal & Reliance Heat Transfer Prize, IIT-Madras *2013-2014*
University-wide prize for academic and research excellence

Publications

Refer to Google Scholar for exhaustive list (15 *published*, 2 *preprints*, ~7000+ citations)
Papers in reverse order by section | [=]equal contributions, [c]corresponding author, lab-member

Preprints

1. Ryan Krueger, Michael P Brenner[c], **Krishna Shrinivas[c]**
   Generalized design of sequence-ensemble-function relationships for intrinsically disordered proteins, *bioRxiv* (2024): 2024-10. | Link to Preprint | *under review*

Key papers

2. Halima H. Schede[=], Pradeep Natarajan[=], Arup K. Chakraborty, and **Krishna Shrinivas[c]**
   A model for organization and regulation of nuclear condensates by gene activity, *Nature Communications* 14, no. 1 (2023): 4152. | Link to paper

3. **Krishna Shrinivas[c]**, Michael P Brenner
   Phase separation in fluids with many interacting components. *Proceedings of the National Academy of Sciences* 118, no. 45 (2021): e2108551118.| Link to paper

4. Jonathan E. Henninger[=], Ozgur Oksuz[=], **Krishna Shrinivas[=]**, Ido Sagi, Gary LeRoy, Ming M. Zheng, J. Owen Andrews Alicia V. Zamudio, Charalampos Lazaris, Nancy M. Hannett, Tong Ihn Lee, Phillip A. Sharp, Ibrahim I. Cissé, Arup K. Chakraborty[c], and Richard A. Young[c]
   RNA-mediated feedback control of transcriptional condensates, *Cell* 184, no. 1 (2021): 207-225. | Link to paper

5. **Krishna Shrinivas**[=], Benjamin R Sabari[=], Eliot L Coffey, Isaac A Klein, Ann Boija, Alicia V Zamudio, Jurian Schuijers, Nancy M Hannett, Phillip A Sharp, Richard A Young, Arup K Chakraborty
   Enhancer features that drive formation of transcriptional condensates, *Molecular Cell* 75, no. 3 (2019): 549-561 | Link to paper

6. Ang Gao[=], **Krishna Shrinivas**[=], Paul Lepeudry, Hiroshi I Suzuki, Phillip A Sharp, Arup K Chakraborty
   Evolution of weak cooperative interactions for biological specificity, *Proceedings of the National Academy of Sciences* 115, no. 47 (2018): E11053-E11060. | Link to paper

7. Benjamin R Sabari, Alessandra Dall'Agnese, Ann Boija, Isaac A Klein, Eliot L Coffey, **Krishna Shrinivas**, Brian J Abraham, Nancy M Hannett, Alicia V Zamudio, John C Manteiga, Charles H Li, Yang E Guo, Daniel S Day, Jurian Schuijers, Eliza Vasile, Sohail Malik, Denes Hnisz, Tong Ihn Lee, Ibrahim I Cisse, Robert G Roeder, Phillip A Sharp, Arup K Chakraborty, Richard A Young
   Coactivator condensation at super-enhancers links phase separation and gene control, *Science* 361, no. 6400 (2018)| Link to paper

8. Denes Hnisz[=], **Krishna Shrinivas**[=], Richard A Young, Arup K Chakraborty, Phillip A Sharp
   A phase separation model for transcriptional control, *Cell*, 169 (2017), pp.13-23.| Link to paper

Extended bibliography

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9. Cameron Chalk, Salvador Buse, **Krishna Shrinivas**, Arvind Murugan and Erik Winfree
   Learning and Inference in a Lattice Model of Multicomponent Condensates, *DNA30* Conference Proceedings (2024) | Link to paper

10. Pradeep Natarajan, **Krishna Shrinivas**, and Arup K. Chakraborty
    A model for cis-regulation of transcriptional condensates and gene expression by proximal lncRNAs, *Biophysical Journal* (2023) S0006-3495. | Link to paper

11. Lu, Wen, Ynes A. Helou, **Krishna Shrinivas**, Jen Liou, Byron B. Au-Yeung, and Arthur Weiss
    The phosphatidylinositol-transfer protein Nir3 promotes PI (4,5) P2 replenishment in response to TCR signaling during T-cell development and survival,*Nature Immunology* 24, no. 1 (2023): 136-147. | Link to paper

12. **Krishna Shrinivas[c],** Michael P Brenner
Multiphase coexistence capacity in complex fluids, *bioRxiv* (2022): 2022-10. | Link to Preprint

13. Isaac A. Klein, Ann Boija, Lena K. Afeyan, Susana Wilson Hawken, Mengyang Fan, Alessandra Dall'Agnese, Ozgur Oksuz, Jonathan E Henninger, **Krishna Shrinivas**, Benjamin R Sabari, Ido Sagi, Victoria E Clark, Jesse M Platt, Mrityunjoy Kar, Patrick M McCall, Alicia V Zamudio, John C Manteiga, Eliot L Coffey, Charles H Li, Nancy M Hannett, Yang Eric Guo, Tim-Michael Decker, Tong Ihn Lee, Tinghu Zhang, Jing-Ke Weng, Dylan J Taatjes, Arup Chakraborty, Phillip A Sharp, Young Tae Chang, Anthony A Hyman, Nathanael S Gray, Richard A Young
Partitioning of cancer therapeutics in nuclear condensates, *Science* 368, no. 6497 (2020): 1386-1392. | Link to paper

14. Yang Eric Guo, John C Manteiga, Jonathan E Henninger, Benjamin R Sabari, Alessandra Dall'Agnese, Nancy M Hannett, Jan-Hendrik Spille, Lena K Afeyan, Alicia V Zamudio, **Krishna Shrinivas**, Brian J Abraham, Ann Boija, Tim-Michael Decker, Jenna K Rimel, Charli B Fant, Tong Ihn Lee, Ibrahim I Cisse, Phillip A Sharp, Dylan J Taatjes, Richard A Young
Pol II phosphorylation regulates a switch between transcriptional and splicing condensates, *Nature* 572, no. 7770 (2019): 543-548 | Link to paper

15. Ann Boija, Isaac A Klein, Benjamin R Sabari, Alessandra Dall'Agnese, Eliot L Coffey, Alicia V Zamudio, Charles H Li, **Krishna Shrinivas**, John C Manteiga, Nancy M Hannett, Brian J Abraham, Lena K Afeyan, Yang E Guo, Jenna K Rimel, Charli B Fant, Jurian Schuijers, Tong Ihn Lee, Dylan J Taatjes, Richard A Young
Transcription factors activate genes through the phase-separation capacity of their activation domains, *Cell* 175, no. 7 (2018): 1842-1855. | Link to paper

16. **Krishna Shrinivas,** Rahul P Kulkarni, Saif Shaikh, Ravindra V Ghorpade, Renu Vyas, Sanjeev S Tambe, S Ponrathnam, Bhaskar D Kulkarni
Prediction of Reactivity Ratios in Free Radical Copolymerization from Monomer Resonance–Polarity (Q–e) Parameters: Genetic Programming-Based Models, *IJCRE* 14, no. 1 (2016): 361-372. | Link to paper

17. Susmita Roy, **Krishna Shrinivas**, Biman Bagchi
A stochastic chemical dynamic approach to correlate autoimmunity and optimal vitamin-D range, *PLoS One* 9, no. 6 (2014): e100635. | Link to paper

Talks

Invited and plenary presentations | contributed talks are specified separately

2024

1. *NU* Faculty Keynote, *Center for Syn. Bio* Retreat, *Northwestern University*
2. Fall Seminar Series, Eng. Sciences and Applied Math, *Northwestern University*
3. Department Seminar, Cell and Dev Bio, *Northwestern University USA*
4. Theory Lunch Seminar, Chemistry, *Northwestern University USA*
5. Physics Colloquium, *University of Illinois, Chicago, USA*

2023

6. Greater Boston Area Statistical Mechanics meeting, *MIT USA*
7. ChBE Dept. Retreat, *Northwestern University*
8. MathBio Annual Meeting, *Simons Foundation NY, USA*

Faculty search seminars:

9. *UCSD* Nano and Chemical Engineering , USA
10. *UCLA* Chemical and Biological Engineering, USA
11. *Caltech* Chemistry and Chemical Engineering, USA
12. *Carnegie Mellon* University Physics and Biology, USA
13. *Stanford University* Chemical Engineering, USA
14. *University of Wisconsin-Madison* Chemical Engineering, USA
15. *Northwestern University* Chemical and Biological Engineering,USA

2022

16. AIChE Conference, *Phoenix, USA* (multiple talks, *contributed*)
17. Rising Stars in Soft and Biological Matter, *UChicago* (virtual)
18. Soft Living Adaptive and Active Matter Talk, *UC Merced* (virtual)
19. Physics of Living Systems Short Talks, *MIT, USA*
20. Genome organization and Nuclear function, *CSHL, USA*

2021

21. Molecular & Cell Biology Seminar, *Harvard, USA*
22. Active Matter Colloquium, *Harvard CMSA, USA*
23. Cell fate symposia, *UC Irvine, USA* (virtual)
24. Dewpoint Therapeutics, *Cambridge MA, USA* (virtual)

2020

25. Kavli Seminar, *Harvard, USA* (virtual)
26. NSF-Simons Colloquia, *Harvard QBio Initiative USA* (virtual)

2019

27. MPI-PKS and MPI-CBG ELBE colloquia, *Dresden, Germany*
28. Center for Systems Biology Seminar, *Dresden, Germany*
29. Lewis-Sigler Institute Symposia, *Princeton, NJ USA*
30. Keystone Symposia on Biomolecular Condensates, *Snowbird USA*
31. IMES Research Seminar Series, *MIT USA*

32. Physics seminar series, *Brandeis USA*
33. MIT Biophysics Retreat, *MIT USA*
34. Phase separation and RNA processing, *San Diego USA*

Patents

Methods and assays for modulating gene transcription by modulating condensates, US Patent App. 17/040,967

Mentorship

Northwestern
Ethan V. Halingstad, *ChBE Graduate student*, Northwestern University (2024 -)
Mary K. Skillicorn, *ChBE Graduate student,* Northwestern University (2024 -)
Kaden DiMarco, *ChBE Graduate student,* Northwestern University (2025 -)
Jackson R. Boodry, *ChBE Graduate student,* Northwestern University (2025 -)

Neha Tyagi, *Postdoctoral Fellow*, Northwestern University (2024 -)

Outside Northwestern
Aidan Zentner, *Graduate student in Physics,* Harvard University (2023 -)
Ryan Krueger, *Graduate student*, Harvard University (2023 -)

Past Mentees (at MIT or Harvard)
Ella King, *PhD candidate,* Harvard University (2021 - 2022)
Ramya Desphande, *PhD candidate*, Harvard University (2021 - 2022)
Halima H. Schede, *MS Thesis*, MIT (2020 - 2022)
Pradeep Natarajan, *PhD candidate*, MIT (2019 - 2023)
Cecilia Salah, *MS Thesis*, MIT (2018)
Paul Lepeudry, *MS Thesis*, MIT (2017)

Teaching and communication

Northwestern
Winter 2025, Instructor, ChBE 422: “Heat and Mass Transfer”
Fall 2024, Instructor, ChBE 376: “Principles of Synthetic Biology”

Before Northwestern

Kavli seminar, 2021-2022

Organized a purely trainee-focused chalk-talk style lecture series on soft matter physics

ChemE Communication Lab, MIT, April 2017 - Dec 2019 | Link to work

Organized workshops, mentored 10+ UROPS, and developed open-access resources

Kaufman Teaching Certificate Program, MIT, June 2019

Teaching Assistant for UG Transport, MIT, May 2018

Student-nominated prize for best TA in department

Service

Northwestern

Faculty Member, Center for Synthetic Biology, 2024 -

Faculty Member, NITMB, 2024 -

ChBE Graduate Committee, 2024 -

ChBE Undergraduate Committee, 2024 -

ChBE Undergraduate Faculty Advisor (7 students), 2024 -

External Service

AIChE 2025 Annual Meeting, ComSEF Session Chair

APS 2024 Annual Meeting, Session Chair for “Nuclear organization”

Broader Professional Service

Peer Review (30+ reviews)

Cell, Science, Physical Review Letters, Proceedings of the National Academy of Sciences, Nature Communications, iScience, Scientific Reports, Journal of Physical Chemistry Letters, EMBO Reports, Soft Matter, Frontiers in Cell & Developmental Biology, Biochemistry and Biophysical Reports, Viruses, Cells, and Biomolecules, Physical Review Letters, EMBO Journal, Cell Systems

Editor

Guest editor for PNAS

eLife Ambassador 2019-2020

Worked on improving open and accessible science outcomes

Phase separation Journal Club, MIT & Harvard (2017-2019)

Organized monthly meetings on phase separation in biology

Membership in Professional Societies

American Institute of Chemical Engineers, 2017 - Present

American Physical Society, 2019 - Present

Biophysical Society, 2024 - Present

American Society of Cell Biology, 2023 - Present

References

References available upon request