# Kate E Galloway

SYNTHETIC BIOLOGY · CELL FATE ENGINEERING · MOLECULAR SYSTEMS BIOLOGY

Massachusetts Institute of Technology, 25 Ames St 66-570A, Cambridge, MA 02420 katiegal@mit.edu | 🍘 gallowaylab.mit.edu | 😰: 0000-0001-7416-3193

# Biography\_

Katie Galloway is the W. M. Keck Career Development Professor in Biomedical Engineering and Chemical Engineering at the Massachusetts Institute of Technology. Her lab focuses on developing integrated gene circuits and identifying the systems-level principles that govern cell-fate transitions with the goal of engineering cell and gene therapies. Galloway earned her PhD in Chemical Engineering from the California Institute of Technology, and a BS in Chemical Engineering from University of California at Berkeley. She completed her postdoctoral work at the University of Southern California. Her research has been featured in *Science, Cell Stem Cell, Cell Systems, Cell Reports, and Development*. She has won multiple fellowships and awards including the NSF CAREER, the MIND Prize, the BMES Cellular and Molecular Bioengineering Rising Star Award, Princeton's CBE Saville Lecture Award, NIH Maximizing Investigators' Research Award, the C. Michael Mohr Award for Undergraduate Teaching in Chemical Engineering at MIT, and Caltech's Everhart Award.

## Education \_\_\_\_\_

California Institute of Technology PHD CHEMICAL ENGINEERING, MINOR BIOLOGY • Advisor: Dr. Christina D Smolke Thesis: Development of DNA based central systems and their conditation to the Seederson	Pasadena, CA 2007 - 2012					
<ul> <li>Inesis: Development of RNA-based control systems and their application to the Saccharomyces cerevisiae responsive MAPK pathway</li> </ul>						
California Institute of Technology	Pasadena, CA					
MS CHEMICAL ENGINEERING	2005 - 2007					
University of California, Berkeley	Berkeley, CA					
BS CHEMICAL ENGINEERING	2001 - 2005					
Graduated with Honors; NCAA Women's Crew Team; NCAA Women's Soccer Team						

# Publications\_

## **Principal Investigator**

## **Pre-prints**

- 31. Johnstone, CP, Love KS, Kabaria, SK, Jones, RD, Blanch-Asensio, A, Peterman EL, Ploessl, DS, Lee, J Yun, J Oakes, CG, Mummery, CL, Davis, RP, DeKosky, BJ, Zandstra, PW, and **Galloway, KE**. Gene syntax defines supercoiling-mediated transcriptional feedback. *bioRxiv*. 2025. Link.
- 30. Beitz AM, Teves, J, Oakes, CG, Johnstone, CP Wang, NB, Brickman, JM and **Galloway, KE**. Cells transit through a quiescentlike state to convert to neurons at high rates. *bioRxiv*. 2024. Link.
- 29. Lende-Dorn, BA, Atkinson, JC, Bae, Y, and **KE Galloway**. Chemogenetic tuning reveals optimal MAPK signaling for cell fate programming. *bioRxiv*. 2024. Link.
- 28. Blanch-Asensio, A, Ploessl, DS, Wang, NB, Mummery, CL, **KE Galloway**<sup>\*</sup>, Davis, RP<sup>\*</sup>. STRAIGHT-IN Dual: A platform for dual, single-copy integrations of DNA payloads and gene circuits into human induced pluripotent stem cells.*bioRxiv*. 2024. \**Co-corresponding*. Link.
- 27. Kabaria, KS, Bae, Y, Beitz AM Lende-Dorn BA Ehmann, ME, Ehmann, Peterman, EL, Love KS, Ploessl, DS, and **Galloway**, **KE**. Programmable promoter editing for precise control of transgene expression.*bioRxiv*. 2024. Link.

#### Published

- 26. Peterman EL, Love KS, Sanabria, V, Daniels, RF, Johnstone CP, Ploessl, DS, Kabaria, KS, Godavarti, DR, Pai, A, and **KE Galloway**. High-resolution profiling reveals coupled transcriptional and translational regulation of transgenes. *Nucleic Acids Research*. 2025. Link.
- 25. Love KS, Johnstone CP, Peterman EL, Gaglione S, Birnbaum, ME and **Galloway, KE**. Model-guided design of microRNAbased gene circuits supports precise dosage of transgenic cargoes into diverse primary cells. *Cell Systems*. 2025. Link
- 24. A Zouein, B Lende-Dorn, **KE Galloway**, T Ellis, F Ceroni. Engineered transcription factor binding arrays for DNA-based gene expression control in mammalian cells. *Trends in Biotechnology*. 2025. Link
- 23. Wang NB, Adewumi HO, Lende-Dorn BA, Beitz AM, O'Shea TM, and **Galloway, KE**. Compact transcription factor cassettes generate functional, engraftable neurons by direct conversion *Cell Systems*. 2025.Link
- 22. Wang NB, Lende-Dorn BA, Adewumi HO, Beitz AM, Han P, O'Shea TM, and **Galloway, KE**. Proliferation history and transcription factor levels drive direct conversion. *Cell Systems*. 2025. Link
- 21. Rivnay, J, Raman, R, Robinson, JT Christian Schreib, C, Tzahi Cohen-Karni, T, **KE Galloway**, Omid Veiseh, O. Integrating bioelectronics with cell-based synthetic biology *Nature Review Bioengineering*. 2025. Link
- 20. Galloway, KE and Johnstone, CP. Bringing neural networks to life. Science. 2024. Link
- 19. I. Incer, A. Pandey, E. Peterman, N. Nolan, **K. E. Galloway**, R. M. Murray, E. D. Sontag, and D. Del Vecchio. Guaranteeing system-level properties in genetic circuits subject to context effects *In Proc. 2024 63rd IEEE Conference on Decision and Control (CDC)*, 2024. Link
- 18. **Galloway, KE**. Rewinding the tape to identify intrinsic determinants of reprogramming potential. *Cellular Reprogramming*. 2024. Link
- 17. Peterman, EL, Ploessl, DS, and **Galloway, KE**. Accelerating diverse cell-based therapies through scalable design. *Annual Review of Chemical and Biomolecular Engineering*. 2024. Link
- 16. Galloway, KE. Changes in cell-cycle rate drive diverging cell fates. Nature Reviews Genetics. 2024. Link
- 15. Takahashi, K, and **Galloway, KE**. RNA-based controllers for engineering gene and cell therapies. *Current Opinion in Biotechnology*. 2023. Link
- 14. Johnstone, CP and **Galloway, KE**. Supercoiling-mediated feedback rapidly couples and tunes transcription. *Cell Reports*. 2022. Link
- Cabera, A\*, Edelstein, HI\*, Glykofrydis, F\*, Love, KS\*, Palacios, S\* Tycko, J\*, Zhang, M\*, Lensch, S, Shields, CE, Livingston, M, Weiss, R, Zhao, H, Haynes, KA, Morsut, L, Chen, YY, Khalil, AS, Wong, WW, Collins, JJ, Rosser, SJ, Karen Polizzi, K, Elowitz, MB, Fussenegger, M, Hilton, IB, Leonard, JN, Bintu, L, **Galloway, KE**, Deans, TL. The sound of silence: transgene silencing in mammalian cell engineering. *Cell Systems*. 2022. Link
- 12. Wang, NB and **Galloway, KE**. Evaluation of Lee et al.: Clarity and interpretation of mutual information in promoter transfer functions. *Cell Systems*. 2021. Link
- 11. Beitz, AM, Oakes, CG, and **Galloway, KE**. Synthetic gene circuits as tools for drug discovery. *Trends In Biotechnology*. 2021. Link
- 10. Johnstone, CP and **Galloway, KE**. Engineering cellular symphonies out of transcriptional noise. *Nature Reviews Molecular Cell Biology* 2021. Link
- 9. Johnstone, CP\*, Wang, NB\*, Sevier, SA, and **Galloway, KE**. Understanding and engineering chromatin as a dynamical system across length and time scales. *Cell Systems*. 2020. \**These authors contributed equally to this work*. Link
- 8. Wang, NB, Beitz, AM, and **Galloway, KE**. Engineering cell fate: Applying synthetic biology to cellular reprogramming. *Current Opinion in Systems Biology*. 2020. Link

#### Postdoctoral

- 7. Babos, KN\*, **Galloway, KE\*,†**, Kisler, K, Zitting, M, Li, Y, Shi, Y, Quintino, B, Chow, RH, Zlokovic, BV, and Ichida, JK.† Mitigating antagonism between transcription and proliferation allows near-deterministic cellular reprogramming. *Cell Stem Cell*. 2019. \**These authors contributed equally to this work.*†*Co-corresponding*. Link
- 6. Ichida, JK, Staats, KA, Davis-Dusenbery, BN, Clement, K, **Galloway, KE**, Babos, KN, Son, EY, Kiskinis, E, Atwater, N, Gu, H, Gnirke, A, Meissner, A, and Eggan, K. Comparative genomic analysis of embryonic, lineage-converted, and stem cell-derived motor neurons. *Development*. 2018. Link

- 5. **Galloway, KE** and Ichida, JK. Modeling neurodegenerative diseases and neurodevelopmental disorders with reprogrammed cells. Stem Cells, Tissue Engineering and Regenerative Medicine. D.A. Warburton, Ed. (World Scientific, New Jersey, 2015).
- 4. Franco, E and **Galloway, KE**. Feedback loops in biological networks. Computational Methods in Synthetic Biology. M. A. Marchisio, Ed. (Springer New York, 2015). Link

#### **Graduate and Pre-graduate**

- 3. **Galloway, KE**, Franco, E, and Smolke, CD. Dynamically reshaping signaling networks to program cell fate via genetic controllers. *Science*. 2013 Link
- 2. Chen, YY\*, **Galloway, KE\***, and Smolke, CD. Synthetic biology: advancing biological frontiers by building synthetic systems. *Genome Biology*. 2012. \**These authors contributed equally to this work*. Link
- 1. Kostal, J, Mulchandani, A, **Gropp, KE**, and Chen, WA. Temperature Responsive Biopolymer for Mercury Remediation. *Environmental Science & Technology*. 2003. Link

#### Awards & Honors \_\_\_\_\_

2025	MIND Pri	ze Aw	arde	<b>e</b> , Pers	hing Squ	uare Fou	undation	

- 2024 Frontiers of Engineering 2024 Selected Attendee , National Academy of Engineering
- 2024 C. Michael Mohr Award for Undergraduate Teaching, MIT Chemical Engineering
- 2024 NSF CAREER Award, National Science Foundation
- 2023 Dudley A. Saville Lecturer, Department of Chemical and Biological Engineering, Princeton
- 2023 Rosalind Franklin Medal Finalist, Rosalind Franklin Society
- 2023 Cellular and Molecular Bioengineering Rising Star, Biomedical Engineering Society
- 2022-2025 W. M. Keck Career Development Professor in Biomedical Engineering, MIT ChemE
- 2019-2022 Charles and Hilda Roddey Career Development Chair, MIT ChemE
- 2017-2019 Maggie McKnight Russell Memorial Postdoctoral Fellow Award, ARCS ARCS, Awarded to one outstanding USC postdoctoral scholar
  - 2018 **2nd Place at the Annual UCI Postdoctoral Symposium**, University of California, Irvine **UCI**, TED talk-style competition for open to all Southern California postdocs
  - 2017 **1st Place at the Annual Postdoctoral Symposium**, USC Postdoctoral Association **USC**, TED talk-style competition
  - 2011 **Everhart Lecturer**, Caltech Everhart Committee **Caltech**, Awarded yearly to three graduate students for research excellence
  - 2006 Honorable Mention, National Science Foundation NSF, Graduate Research Fellowship Program
- 2001-2005 Scholar, Reagent's and Chancellor's Scholarship University of California, Berkeley, Top 1% of incoming students
- 2001-2005 **Most Valuable Student**, Elks Foundation **Elks National Foundation**, Top 500 students nationally

## Presentations \_

- 73. September 2025. Cell Fate Transitions. Invited. Cold Spring Harbor, NY
- 72. Aug 2025. Picower Institute Faculty Lunch. Invited. Cambridge, MA
- 71. July 2025. NSF Genome Architecture and Function Summer School and Workshop. Invited. Sophia, Bulgaria.
- 70. May 2025. Single Cell Proteomics. Northeastern University. Invited. Boston, MA
- 69. May 2025. SynbioBeta. Invited. San Jose, CA
- 68. April 2025. American Society for Biochemistry and Molecular Biology (ASBMB) Annual Meeting. Invited. Chicago, IL
- 67. April 2025. Chan-Zuckerberg Institute (CZI) Cell Science Grantee Meeting. Invited. Chicago, IL

- 66. April 2025. McGovern Institute for Brain Research Faculty Lunch. Invited. Cambridge, MA
- 65. March 2025. ACS BIOT. Invited. San Diego, CA
- 64. March 2025. Harvard Medicine Department of Surgery Surgical Horizon's Seminar. Invited. Boston, MA
- 63. March 2025. UC Berkeley Department of Chemical Engineering. Invited. Berkeley, CA
- 62. February 2025. Pershing Square MIND prize finalist. Invited. NYC, New York
- 61. February 2025. Winter Quantitative Biology (q-bio). Oahu, Hawaii
- 60. December 2024. VIB Next-Generation Synthetic Biology. Invited. Ghent, Belgium
- 59. October 2024. DTU BioSUSTAIN. Invited. Copenhagen, Denmark
- 58. October 2024. University of Pennsylvania, Stem Cell Club. Invited. Philadelphia, PA
- 57. September 2024. Discovery on Target: Synthetic Biology for Drug Discovery and Therapy. Invited. Boston, MA
- 56. July 2024. Biochemical and Molecular Engineering XXIII. Invited. Dublin, Ireland
- 55. June 2024. Synthetic Biology, Engineering, Evolution, and Design (SEED). Invited. Atlanta, GA
- 54. April 2024. Syn-BYSS: SynBio Young Speaker Series. Invited. Virtual Seminar Series
- 53. April 2024. Caltech Department of Chemical Engineering. Invited. Pasadena, California
- 52. April 2024. Stanford Department of Chemical Engineering. Invited. Stanford, California
- 51. March 2024. Fragile Nucleosome. Invited. Virtual Seminar Series
- 50. January 2024. University of Toronto Department of Chemical Engineering. Invited. Toronto, Canada
- 49. January 2024. University of Stanford, Genetics Retreat . Invited. Stanford, California
- 48. January 2024. University of Massachusetts Department of Systems Biology. Invited. Amherst, Massachusetts
- 47. December 2023. Boston University Department of Biology. Invited. Boston, CA
- 46. November 2023. USC Michelson Center Convergent STEM Seminar. Invited. Programming cell fate. Los Angeles, California
- 45. November 2023. USC Department of Quantitative and Computational Biology. Invited. Los Angeles, California
- 44. November 2023. Massachusetts General Hospital Cancer Center. Invited. Boston, Massachusetts
- 43. November 2023. Northwestern Synthetic Biology Retreat. Invited Keynote Speaker. Boston, Massachusetts
- 42. October 2023. Princeton Department of Chemical and Biological Engineering . **Invited Saville Lecture.** Princeton, New Jersey
- 41. October 2023. Cornell Department of Biomedical Engineering and Center for Vertebrate Genomics. **Invited.** Ithaca, New York
- 40. September 2023. Cytiva-Danaher Q3 2023 Scientific Advisory Board. Invited. Virtual
- 39. July 2023. Genome Writer Guild Conference. Invited award lecture. Minneapolis, Minnesota
- 38. July 2023. Gordon Research Conference Synthetic Biology. Invited. Boston, Massachusetts
- 37. April 2023. Northeastern Synthetic Biology Symposium. Invited Keynote Speaker. Boston, Massachusetts
- 36. March 2023. Iowa State Department of Chemical Engineering Seminar. Invited. Ames, Iowa
- 35. March 2023. Ohio State Department of Biomedical Engineering Seminar. Invited. Columbus, Ohio
- 34. March 2023. American Physical Society; Division of Biological Physics (DBIO). Invited Keynote Speaker. Las Vegas, Nevada
- 33. February 2023. Harvard Topics in Bioengineering. Invited Speaker. Cambridge, Massachusetts
- 32. January 2023. BMES Cellular and Molecular Bioengineering (CMBE). **Rising Star Awardee + Speaker.** Palm Springs, California

- 31. December 2022. NIBIB Synthetic Biology Consortium Meeting. Invited. NIBIB, Virtual
- 30. December 2022. Dana-Farber Center for Functional Cancer Epigenetics. Invited. Boston, Massachusetts
- 29. November 2022. Australian Mathematical Sciences Institute BioInfoSummer. **Invited Keynote Speaker.** Melbourne, Australia
- 28. October 2022. Biomedical Engineering Society Annual Meeting. San Antonio, Texas
- 27. October 2022. International Conference on Stem Cell Engineering. Invited. Cambridge, Massachusetts
- 26. August 2022. Merck Discovery Biologics. Invited. Rahway, New Jersey
- 25. August 2022. CHSL Synthetic Biology Course. Invited. Cold Spring Harbor, New York
- 24. July 2022. mammalian Synthetic Biology Workshop. Invited. Edinburgh, Scotland
- 23. June 2022. GRC Bioanalytical Invited. . Virtual
- 22. May 2022. National Institute of Health Heart, Lung, and Blood (NHLBI) WORKSHOP Synthetic Biology and New Directions for HLBS Application Workshop **Invited.** Virtual
- 21. May 2022. Synthetic Biology: Engineering, Evolution, and Design. Arlington, Virgina
- 20. April 2022. 48th Annual Northeast Bioengineering Conference at Columbia University. Invited. Columbia University
- 19. Jan 2022. Advanced Systems and Synthetic Biology. Invited. University of Washington
- 18. Dec 2021. BU BME Graduate Student Research Symposium. Keynote Speaker. Boston University
- 17. Dec 2021. Squishy Physics seminar series, Invited. Harvard University
- 16. Dec 2021. 8th International Conference on Stem Cell Engineering, Invited (postponed). \*postponed
- 15. Nov 2021. AIChE Annual Meeting. Invited. Boston, MA.
- 14. Nov 2021. AIChE Annual Meeting. Boston, MA.
- 13. Nov 2021. AIChE Annual Meeting. Boston, MA.
- 12. Sept 2021. DNA Topology in genomic transactions, EMBO Workshop. Virtual.
- 11. Sept 2021. NIH Epigenetics and Stem Cell Biology Laboratory. Invited. Virtual.
- 10. July 2021. Mammalian Synthetic Biology Workshop. Invited. Virtual.
- 9. June 2021. International Society for Stem Cell Research (ISSCR) Annual Meeting. Invited. Virtual.
- 8. Mar 2021. Keystone Single Cell Biology. Invited. Virtual.
- 7. Dec 2020. Mammalian Synthetic Biology Workshop Virtual. Invited Virtual.
- 6. Nov 2020. AIChE Annual Meeting Virtual.
- 5. Oct 2020. Epigenetics and Bioengineering (EpiBio). Virtual.
- 4. Jun 2020. International Society for Stem Cell Research (ISSCR) Annual Meeting.Virtual.
- 3. May 2020. Mammalian Synthetic Biology Workshop 7.0. Invited. Delayed:Covid-19
- 2. May 2020. Gene Expression And Regulation (GEARS) Symposium. Invited. HMS, Boston, MA. Delayed:Covid-19
- 1. Mar 2020. Koch Institute for Integrative Cancer Research Seminar. Invited. Massachusetts Institute of Technology, Cambridge, MA.

## Teaching Experience

2019-2024	10.10: Introduction to Chemical Engineering, Instructor, 6.5/7	MIT
2021-2022	10.521: Design Principles in Mammalian Systems + Synthetic Biology, Instructor, 6.5/7	MIT
2020-2024	UROP: "How to Science" + Computational modeling of gene circuits, Instructor	MIT

# Professional Activities

- 2022-2025 Founder and Organizer, Boston Mammalian Synthetic Biology Symposium
- 2022-2025 Advisory Board, Cell Reports
- 2022-2024 Early Career Advisory Board, Stem Cell Reports
- 2020-2025 Organizing committee, Mammalian Synthetic Biology Workshop (mSBW)
- 2020-2023 Organizing committee, Epigenetics and Bioengineering (EpiBio)
- 2022-2023 Conference Chair, International Conference on Biomolecular Engineering (ICBE)
- 2022-2023 Organizing committee, Synthetic Biology, Evolution, Engineering, and Design (SEED)
- 2022-2025 Organizing committee, Synthetic Biology for Future Health-Wellcome Trust
- 2019-2023 Theme and session chair, AIChE Annual Meeting, Bioengineering (Division 15)
- 2021-2023 Session chair, American Chemical Society (ACS)-BIOT
  - Adhoc reviewer, Science, Cell, Cell Systems, Nucleic Acids Research, PNAS, Nature
- 2019-2026 Communications, Cell Chemical Biology, Science Advances, Cell Reports, ACS Synthetic Biology, eLife, Oxford Synthetic Biology