

# Kate E Galloway

SYNTHETIC BIOLOGY · STEM CELLS · 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

## Professional Experience

---

- Since 2019 **Assistant Professor of Chemical Engineering**, Massachusetts Institute of Technology  
**W.M Keck Career Development Professor in Biomedical Engineering**, Keck Foundation  
**Extramural Member**, The Koch Institute for Integrative Cancer Research at MIT  
**Associate Member**, The Broad
- 2013-2019 **Postdoctoral Fellow**, University of Southern California, USC Stem Cell  
2013 **Adjunct Assistant Professor of Chemistry**, Harvey Mudd College
- 2007-2008 **Graduate Teaching Assistant**, Chemical Engineering, California Institute of Technology  
2003 **Intern in Protein Recovery Sciences**, Genentech
- 2000-2001 **Research Assistant**, Chemical and Environmental Engineering, University of California, Riverside

## Education

---

- California Institute of Technology** Pasadena, CA  
PHD CHEMICAL ENGINEERING, MINOR BIOLOGY 2007 - 2012  
• Advisor: Dr. Christina D Smolke  
• Thesis: Development of RNA-based control systems and their application to the *Saccharomyces cerevisiae* pheromone-responsive MAPK pathway
- 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

---

14. Johnstone, CP and **Galloway, KE**. Supercoiling-mediated feedback rapidly couples and tunes transcription. *Cell Reports*. 2022. doi:10.1016/j.celrep.2022.111492.
13. Wang, NB and **Galloway, KE**. Evaluation of Lee et al.: Clarity and interpretation of mutual information in promoter transfer functions *Cell Systems*. 2021. doi:10.1016/j.cels.2021.08.014
12. Cable, J, Elowitz, MB, Domingos, AI, Habib, N, Itzkovitz, S, Hamidzada, H., Balzer, M.S., Yanai, I., Liberali, P, Whited, J, Streets, A, Cai, L, Stergachis, AB, Hong, CKY, Keren, L, Guilliams, M, Alon, U, Shalek, AK, Hamel, R, Pfau, SJ, Raj, A, Quake, SR, Zhang, NR, Fan, J, Trapnell, C, Wang, B, Greenwald, NF, Vento-Tormo, R, Santos, SDM, Spencer, SL, Garcia, HG, Arekatla, G, Gaiti, F, Arbel-Goren, R, Rulands, S, Junker, JP, Klein, AM, Morris, SA, Murray, JI, **Galloway, KE**, Ratz, M, Romeike, M. Single cell biology-a Keystone Symposia report. *Ann N Y Acad Sci* 2021. doi:10.1111/nyas.14692.
11. Beitz, AM, Oakes, CG, and **Galloway, KE**. Synthetic gene circuits as tools for drug discovery. *Trends In Biotechnology*. 2021. doi:10.1016/j.tibtech.2021.06.007
10. Johnstone, CP and **Galloway, KE**. Engineering cellular symphonies out of transcriptional noise. *Nature Reviews Molecular Cell Biology* 2021. doi:10.1038/s41580-021-00359-5
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. doi:10.1016/j.cels.2020.09.011. \*These authors contributed equally to this work.

8. Wang, NB, Beitz, AM, and **Galloway, KE**. Engineering cell fate: Applying synthetic biology to cellular reprogramming. *Current Opinion in Systems Biology*. 2020. doi:10.1016/j.coisb.2020.09.002
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. doi:10.1016/j.stem.2019.08.005. \*These authors contributed equally to this work. Highlighted in "Collisions on the Busy DNA Highway Set Up Barriers for Reprogramming." Xiao Hu and Shangqin Guo. *Cell Stem Cell*. 2019.
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. doi: 10.1242/dev.168617.
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).
3. **Galloway, KE**, Franco, E, and Smolke, CD. Dynamically reshaping signaling networks to program cell fate via genetic controllers. *Science*. 2013. Highlighted in "Concentrating (on) native proteins to control cell fate." Sarkar, Casim A. *Science*. 2013.doi:10.1126/science.12350050
2. Chen, YY\*, **Galloway, KE\***, and Smolke, CD. Synthetic biology: advancing biological frontiers by building synthetic systems. *Genome Biology*. 2012. doi:10.1186/gb-2012-13-2-240 \*These authors contributed equally to this work.
1. Kostal, J, Mulchandani, A, **Gropp, KE**, and Chen, WA. Temperature Responsive Biopolymer for Mercury Remediation. *Environmental Science & Technology*. 2003. doi.10.1021/es034210y

## Awards & Honors

---

- 2022-2025 **W. M. Keck Career Development Professor in Biomedical Engineering**, Keck Foundation
- 2019-2022 **Charles and Hilda Roddey Career Development Chair**,
- 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
- 2018 **Audrey E. Streedain Postdoctoral Travel Award**, USC Stem Cell  
USC, Travel award
- 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
- 2001 **National Finalist**, Stockholm Junior Water Prize  
Stockholm International Water Institute, For innovation in water research

## Teaching Experience

---

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

## Presentations

---

29. December 2022. Dana-Farber Center for Functional Cancer Epigenetics. **Invited Speaker.** *Engineering high-precision, dynamic genetic control systems for cellular reprogramming.* Boston, Massachusetts
28. November 2022. Australian Mathematical Sciences Institute (AMSI) BioInfoSummer. **Invited Keynote Speaker.** *Supercoiling-mediated feedback rapidly couples and tunes transcription.* Melbourne, Australia
27. October 2022. Biomedical Engineering Society Annual Meeting. *Engineering high-precision, dynamic genetic control systems for cellular reprogramming.* San Antonio, Texas
26. October 2022. International Conference on Stem Cell Engineering. **Invited.** *Engineering high-precision, dynamic genetic control systems for cellular reprogramming.* Cambridge, Massachusetts
25. August 2022. Merck Discovery Biologics. **Invited.** *Engineering high-precision, dynamic genetic control systems for cellular reprogramming.* Rahway, New Jersey
24. August 2022. CHSL Synthetic Biology Course. **Invited.** *Synthetic biology approaches to engineering cell fate via cellular reprogramming.* Cold Spring Harbor, New York
23. July 2022. mammalian Synthetic Biology Workshop. **Invited.** *Engineering high-precision, dynamic genetic control systems for cellular reprogramming.* Edinburgh, Scotland
22. May 2022. National Institute of Health Heart, Lung, and Blood (NHLBI) WORKSHOP - Synthetic Biology and New Directions for HLBS Application Workshop **Invited.** *Harnessing supercoiling-mediated feedback to enhance cellular programming.* Virtual
21. May 2022. Synthetic Biology: Engineering, Evolution, and Design *Harnessing supercoiling-mediated feedback to enhance cellular programming.* Arlington, Virginia
20. April 2022. 48th Annual Northeast Bioengineering Conference at Columbia University. **Invited.** *Circuit syntax: Engineering gene circuits to optimally harness biophysical feedback.* Columbia University
19. Jan 2022. Advanced Systems and Synthetic Biology. **Invited.** *Synthetic biology approaches to engineering cell fate across systems.* University of Washington
18. Dec 2021. Keynote Speaker Invitation BU BME Graduate Student Research Symposium, **Invited.** *Engineering cell fate via cellular reprogramming.* Boston University
17. Dec 2021. Squishy Physics seminar series, **Invited.** *Detangling DNA to program gene expression.* Harvard University
16. Dec 2021. 8th International Conference on Stem Cell Engineering, **Invited (postponed).** *Engineering cell fate via cellular reprogramming.* \*postponed
15. Nov 2021. AIChE Annual Meeting, **Invited.** *Engineering cell fate via cellular reprogramming.* Boston, MA.
14. Nov 2021. AIChE Annual Meeting, *Harnessing p53 to stabilize accelerated, dual-phase reprogramming.* Boston, MA.
13. Nov 2021. AIChE Annual Meeting, *Engineering modular, portable RNA-based control systems for cellular reprogramming.* Boston, MA.
12. Sept 2021. DNA Topology in genomic transactions, EMBO Workshop. *Detangling DNA: Balancing biophysical tradeoffs drives cellular reprogramming.* Virtual.
11. Sept 2021. NIH Epigenetics and Stem Cell Biology Laboratory, **Invited.** *Engineering cell fate via cellular reprogramming.* Virtual.
10. July 2021. Mammalian Synthetic Biology Workshop, **Invited.** *Engineering cell fate via cellular reprogramming.* Virtual.
9. June 2021. International Society for Stem Cell Research (ISSCR) Annual Meeting. **Invited.** *Launching a lab in the times of COVID-19; Discussion Panel.* Virtual.

8. Mar 2021. Keystone Single Cell Biology, *Detangling DNA: Balancing biophysical tradeoffs drives cellular reprogramming*. Virtual.
7. Dec 2020. Mammalian Synthetic Biology Workshop Virtual. **Invited** *Detangling DNA: Balancing biophysical tradeoffs drives cellular reprogramming*. Virtual.
6. Nov 2020. AIChE Annual Meeting *Detangling DNA: Balancing biophysical tradeoffs drives cellular reprogramming*. Virtual.
5. Oct 2020. Epigenetics and Bioengineering (EpiBio), *Detangling DNA: Balancing biophysical tradeoffs drives cellular reprogramming*. Virtual.
4. Jun 2020. International Society for Stem Cell Research (ISSCR) Annual Meeting, *Harnessing p53 to stabilize accelerated, dual-phase reprogramming*. Virtual.
3. May 2020. Mammalian Synthetic Biology Workshop 7.0, **Invited**. *Detangling DNA: Balancing biophysical tradeoffs drives cellular reprogramming*. University of Edinburgh, Edinburgh, Scotland. Delayed: Covid-19
2. May 2020. Gene Expression And Regulation (GEARS) Symposium, **Invited**. *Slick software, slow hardware: Balancing biophysical tradeoffs drives cellular reprogramming*. Harvard Medical School, Boston, MA. Delayed: Covid-19
1. Mar 2020. Koch Institute for Integrative Cancer Research Seminar, **Invited**. *Slick software, slow hardware: Balancing biophysical tradeoffs drives cellular reprogramming*. Massachusetts Institute of Technology, Cambridge, MA.

## Professional Development

---

- 2022 **Founder and Organizer**, Boston Mammalian Synthetic Biology Symposium
- 2020-2023 **Organizing committee**, Mammalian Synthetic Biology Workshop (mSBW)
- 2020-2022 **Organizing committee**, Epigenetics and Bioengineering (EpiBio)
- 2022-2023 **Organizing committee**, International Conference on Biomolecular Engineering (ICBE)
- 2022-2023 **Organizing committee**, Synthetic Biology for Future Health-Wellcome Trust
- 2019-2022 **Theme and session chair**, American Institute of Chemical Engineers (AIChE) Annual Meeting, Bioengineering (Division 15)
- 2021-2023 **Session chair**, American Chemical Society (ACS) Spring Meeting, Division of Biochemical Technology (BIOT)
- 2019-2022 **Adhoc reviewer**, Cell Systems, Nucleic Acids Research, Nature Communications, Cell Chemical Biology, Science Advances, ACS Synthetic Biology, eLife, Oxford Synthetic Biology, Current Opinion in Biomedical Engineering

## Professional Memberships

---

American Institute of Chemical Engineers  
 International Society for Stem Cell Research  
 Biomedical Engineering Society  
 Society for Biological Engineering  
 American Chemical Society