

## **Ahmad (Mo) Khalil, PhD**

Dorf-Ebner Distinguished Professor, Department of Biomedical Engineering  
Associate Director, Biological Design Center  
Boston University  
Visiting Scholar, Wyss Institute for Biologically Inspired Engineering  
Harvard University

### **Contact**

Mail: 610 Commonwealth Ave, Rm 405C, Boston, MA 02215  
Telephone: +1 617-358-6957, Email: [khalil@bu.edu](mailto:khalil@bu.edu), Lab: [www.bu.edu/khalillab](http://www.bu.edu/khalillab)

### **Education**

2009 PhD, Mechanical Engineering, MIT (Advisor: Dr. Angela M. Belcher)  
2004 MSc, Mechanical Engineering, MIT (Advisor: Dr. Roger D. Kamm)  
2002 BSc, Mechanical Engineering (Chemistry Minor), Stanford University

### **Postdoctoral Training**

2008–11 HHMI Postdoctoral Fellow, Boston University (Advisor: Dr. James J. Collins)

### **Professional Experience**

2023– Professor, Department of Biomedical Engineering, Boston University  
2019–2023 Associate Professor, Department of Biomedical Engineering, Boston University  
2019– Co-Director, Synthetic Biology & Biotechnology (SB2) NIH/NIGMS T32 PhD Training Program  
2015– Associate Director and Founding Member, Biological Design Center, Boston University  
2014– Visiting Scholar, Wyss Institute for Biologically Inspired Engineering, Harvard University  
2012–2018 Assistant Professor, Department of Biomedical Engineering, Boston University  
2012– Faculty, Molecular Biology, Cell Biology & Biochemistry Program, Boston University  
Faculty, Bioinformatics Program, Boston University

### **Extramural Appointments**

2022– Scientific Advisory Board, Kytopen Corp.  
2021– Scientific Advisory Board, Capra Biosciences, Inc.  
2021– Consultant, Novartis Institutes for BioMedical Research, Inc.  
2020– Co-Founder, K2 Biotechnologies, Inc.  
2020– Scientific Advisory Board, Chroma Medicine, Inc.  
2018– Co-Founder, Fynch Bio, Inc.  
2018– Scientific Advisory Board, Senti Biosciences, Inc.  
2018–2019 Consultant, Merck & Co., Inc.  
2017–2019 Scientific Advisor, Sigilon Therapeutics, Inc.

### **Awards & Honors (selected)**

2022 Schmidt Science Polymath Award  
2022 W. M. Keck Foundation Medical Research Award  
2021 AIMBE College of Fellows  
2020 DoD Vannevar Bush Faculty Fellowship (VBFF)  
2019 Dorf-Ebner Distinguished Faculty Fellow  
2018 National Academy of Engineering (NAE) Frontiers of Engineering Invitee  
2017 Presidential Early Career Award for Scientists and Engineers (PECASE)  
2017 Boston University Early Career Research Excellence Award  
2016 NIH New Innovator Award  
2016 DARPA Young Faculty Award  
2016 Outstanding Professor of the Year, College of Engineering, Boston University  
2016 Award for Teaching Excellence, Biomedical Engineering Dept., Boston University

2015	Hartwell Foundation Individual Biomedical Research Award (Hartwell Investigator)
2015	Award for Teaching Excellence, Biomedical Engineering Dept., Boston University
2014	National Academy of Engineering (NAE) Frontiers of Engineering Education Invitee
2014	NSF CAREER Award
2013–2016	Innovation Career Development Professorship, Boston University
2013	Award for Teaching Excellence, Biomedical Engineering Dept., Boston University
2013	Institut Mérieux Research Grant Award
2012	Wallace H. Coulter Foundation Translational Research Partnership Award
2005	Charles Stark Draper Laboratory Graduate Fellowship, MIT
2002	Graduated with Distinction, Stanford University
2002	Phi Beta Kappa Liberal Arts & Sciences Honors Society, Stanford University
2002	Tau Beta Pi Engineering Honors Society, Stanford University

## Research Summary

My laboratory is developing novel tools of synthetic biology that allow us to construct regulatory circuits inside living cells that recapitulate complex functions like those seen in nature. We are using our tools to dissect the molecular circuits that control gene regulation in eukaryotes, toward addressing the grand challenge of understanding their organization across scale and how they function to generate diverse cellular phenotypes. The basic insights we generate inform the development of platforms to program therapeutically-useful cellular functions for emerging gene and cell-based therapies, such as CAR-T cells for cancer. In addition, my team is developing novel continuous evolution technologies that are automated and scalable, and applying these to generate biomolecules with radically altered or new functions to address unmet needs in biology, medicine and biotechnology. To broaden the impact of our basic science and medical discoveries, we make the technologies we develop widely usable and accessible to the scientific community. By learning how to build biological systems from scratch, our broad goal is to connect the basic molecular building blocks of life to complex cellular behavior and ultimately to clinical applications.

## Publications (\*equal, † co-corresponding)

1. Jo, C., Zhang, J., Tam, J. M., Church, G.M., **Khalil, A.S.**, Segrè, D., Tang, T.C. Unlocking the magic in mycelium: Using synthetic biology to optimize filamentous fungi for biomanufacturing and sustainability. *Materials Today Bio*, 19: 100560 (2023).
2. Huang, T.P.\*, Heins, Z.J.\*, Miller, S.M., Wong, B.G., Balivada, P.A., Wang, T., **Khalil, A.S.**†, Liu, D.R.† High-throughput continuous evolution of compact Cas9 variants targeting single-nucleotide-pyrimidine PAMs. *Nature Biotechnology*, 41, 96-107 (2023).
3. Cabrera, A., Edelstein, H.I., Glykofrydis, F., Love, K.S., Palacios, S., Tycko, J., Zhang, M., Lensch, S., Shields, C.E., Livingston, M., Weiss, R., Zhao, H., Haynes, K.A., Morsut, L., Chen, Y.Y., **Khalil, A.S.**, Wong, W.W., Collins, J.J., Rosser, S.J., Polizzi, K., Elowitz, M.B., Fussenegger, M., Hilton, I.B., Leonard, J.N., Bintu, L., Galloway, K.E., Deans, T.L. The sound of silence: transgene silencing in mammalian cell engineering. *Cell Systems*, 13: 950-973 (2022).
4. Bragdon, M.D.J\*, Patel, N.\*, Chuang, J., Levien, E., Bashor, C.J.\*, **Khalil, A.S.\***. Cooperative assembly confers regulatory specificity and long-term genetic circuit stability. *bioRxiv* doi: 10.1101/2022.05.22.492993
5. Li, H.\*, Israni, D.V.\*, Gagnon, K.A., Gan, K.A., Raymond, M.H., Sander, J.D., Roybal, K.T., Joung, J.K., Wong, W.W., **Khalil, A.S.** Multidimensional control of therapeutic human cell function with synthetic gene circuits. *Science*, 378: 1227-1234 (2022).
  - *Perspective*: Salazar-Cavazos E. and Altan-Bonnet A. Engineering time-controlled immunotherapy. *Science*, 378 (2022).
  - *News*: Ledford H. Cancer treatments boosted by immune-cell hacking. *Nature* (15 December 2022).
  - *News & Opinion*: Mesa N. “Smarter” CAR T cells target tumors with precision. *The Scientist* (16 December 2022).
  - *News Feature*: Ledford H. The race to supercharge cancer-fighting T cells. *Nature* (25 January 2023).

6. Martinez-Corral, R., Park, M., Biette, K., Friedrich, D., Scholes, C., **Khalil, A.S.**, Gunawardena, J., DePace, A. Transcriptional kinetic synergy: a complex landscape revealed by integrating modelling and synthetic biology. *bioRxiv*, doi: 10.1101/2020.08.31.276261
7. Sanford, A., Kiriakov, S., **Khalil, A.S.** A toolkit for precise, multi-gene control in *Saccharomyces cerevisiae*. *ACS Synthetic Biology*, 11: 3912-3920 (2022).
8. Sun, Q., Vega, N.M., Cervantes, B., Mancuso, C.P., Mao, N., Taylor, M., Collins, J.J., **Khalil, A.S.**, Gore, J., Lu, T.K. Enhancing nutritional niche and host defenses by modifying the gut microbiome. *Molecular Systems Biology*, 18: e9933 (2022).
9. Lee, S., **Khalil, A.S.**, Wong, W.W. Recent progress of gene circuit designs in immune cell therapies. *Cell Systems*, 13: 864-873 (2022).
10. Li, H.\*, Wong, N.M.\*, Tague, E., Ngo, J.T., **Khalil, A.S.**, Wong, W.W. High-performance multiplex drug-gated CAR circuits. *Cancer Cell*, 40: 1-12 (2022).
11. Shaw, W.M., Zhang, Y., Lu, X., **Khalil, A.S.**, Ladds, G., Luo, X., Ellis, T. Screening microbially produced  $\Delta^9$ -tetrahydrocannabinol using a yeast biosensor workflow. *Nature Communications*, 13: 5509 (2022).
12. Zhu, I., Liu, R., Garcia, J.M., Hyrenius-Wittsten, A., Piraner, D.I., Alavi, J., Israni, D.V., Liu, B., **Khalil, A.S.**, Roybal, K.T. Modular design of synthetic receptors for programmed gene regulation in cell therapies. *Cell*, 185: 1431-1443 (2022).
  - *News & Views*: Hamieh M. & Themeli M. Synthetic circuits suited for the clinic. *Nature*, 606 (2022).
13. Kunze, C., **Khalil, A.S.** One cell, many fates (Preview). *Science*, 375: 262-263 (2022).
14. Molina, R.S., Rix, G., Mengiste, A.A., Alvarez, B., Seo, D., Chen, H., Hurtado, J., Zhang, Q., Garcia-Garcia, J.D., Heins, Z.J., Almhjell, P.J., Arnold, F.H., **Khalil, A.S.**, Hanson, A.D., Dueber, J.E., Schaffer, D.V., Chen, F., Kim, S., Fernandez, L.A., Shoulders, M.D., Liu, C.C. *In vivo* hypermutation and continuous evolution. *Nature Reviews Methods Primers*, 2: 36 (2022).
15. Mancuso, C.P., Lee, H., Abreu, C.I., Gore, J., **Khalil, A.S.** Environmental fluctuations reshape and unexpected diversity-disturbance relationship in a microbial community. *eLife*, 10: e67175 (2021).
16. Sutradhar, I., Ching, C., Desai, D., Suprenant, M., Briars, E., Heins, Z., **Khalil, A.S.**, Zaman, M.H. Computational model to quantify the growth of antibiotic-resistant bacteria in wastewater. *mSystems*, 6: e0036021 (2021).
17. Moussa, H.F., Angstman, J.F., **Khalil, A.S.** Here to stay: writing lasting epigenetic memories (Preview). *Cell*, 184: 2281-2283 (2021).
18. Annas, G.J., Beisel, C.L., Clement, K., Crisanti, A., Francis, S., Galardini, M., Galizi, R., Grünewald, J., Immobile, G., **Khalil, A.S.**, Müller, R., Pattanayak, V., Petri, K., Paul, L., Pinello, L., Simoni, A., Taxiarchi, C., Joung, J.K. A code of ethics for gene drive research. *Crispr J.*, 4: 19-24 (2021).
19. Zhong, Z.\*, Wong, B.G.\*, Ravikumar, A., Arzumanyan, G.A., **Khalil, A.S.**<sup>†</sup>, Liu, C.C.<sup>†</sup> Automated continuous evolution of proteins *in vivo*. *ACS Synthetic Biology*, 9: 1270-1276 (2020).
20. Qian, J.\*, Lu, Z.X.\*, Mancuso, C.P.\*, Jhuang, H.Y.\*, Del Carmen Barajas-Ornelas, R.\*, Boswell, S.A.\*, Ramirez-Guadiana, F.H., Jones, V., Sonti, A., Sedlack, K., Artzi, L., Jung, G., Arammash, M., Pettit, M.E., Melfi, M., Lyon, L., Owen, S.V., Baym, M., **Khalil, A.S.**, Silver, P.A., Rudner, D.Z., Springer, M. Barcoded microbial system for high-resolution object provenance. *Science*, 368: 1135-1140 (2020).
  - *Perspective*: Nivala J. Follow the barcoded microbes. *Science*, 368 (2020).
21. Chiesa, G.\*, Kiriakov, S.\*, **Khalil, A.S.** Protein assembly systems in natural and synthetic biology. *BMC Biology*, 18: 35 (2020).
22. Tanner, K., Mancuso, C.P., Peretó, J., **Khalil, A.S.**, Vilanova, C., Pascual, J. *Spingomonas solaris* sp. nov., isolated from a solar panel in Boston, Massachusetts. *International Journal of Systematic and Evolutionary Microbiology*, 70: 1814-1821 (2020).

23. Bashor, C.J.\*, Patel, N.\*, Beyzavi, A., Choubey, S., Kondev, J., Collins, J.J., **Khalil, A.S.** Complex signal processing in synthetic gene circuits using cooperative regulatory assemblies. *Science*, 364: 593-597 (2019).
  - *Perspective*: Ng A.H. and El-Samad H. Synthetic transcriptional synergy. *Science*, 364 (2019).
  - *News & Views*: Cloney R. Cooperating on synthetic gene circuits. *Nat. Biotechnol.* 37 (2019).
24. Heins, Z.J., Mancuso, C.M., Kiriakov, S., Wong, B.G., Bashor, C.J., **Khalil, A.S.** Designing automated, high-throughput continuous cell growth experiments using eVOLVER. *Journal of Visualized Experiments*, 147: e59652 (2019).
25. Lee, H.H., Ostrov, N., Wong, B.G., Gold, M.A., **Khalil, A.S.**, Church, G.M. Functional genomics of the rapidly replicating bacterium *Vibrio natriegens* by CRISPRi. *Nature Microbiology*, 4: 1105-1113 (2019).
  - **Journal Cover**
  - *News & Views*: D’Gama J.D. and Waldor M.K. An ‘I’ for ingenuity. *Nat. Microbiol.*, 4 (2019).
26. Park, M., Patel, N., Keung, A.J., **Khalil, A.S.** Engineering epigenetic regulation using synthetic read-write modules. *Cell*, 176: 227-238 (2019).
  - *Faculty of 1000*.
  - *Research Highlight*: Trenkmann M. Synthetic readers and writers for mammalian chromatin. *Nat. Rev. Genet.*, 20 (2019).
  - *Research Highlight*: Rusk N. Creating epigenetic memory. *Nat. Methods*, 16 (2019).
  - *Viewpoint*: Loveless T.B. and Liu C.C. Synthetic epigenetics to engineer regulation. *Biochemistry*, 58 (2019).
  - *Spotlight*: Chang T.Z., Kuo J. and Silver P.A. Beyond the four bases: a home run for synthetic epigenetic control? *Mol. Cell*, 74 (2019).
  - *Research Highlight*: Song Y. Pass it along. *Nat. Chem. Biol.*, 15 (2019).
27. Weinstein, Z.B., Kuru, N., Kiriakov, S., Palmer, A.C., **Khalil, A.S.**, Clemons, P.A., Zaman, M.H., Roth, F.P., Cokol, M. Modeling the impact of drug interactions on therapeutic selectivity. *Nature Communications*, 9: 3452 (2018).
28. Wong, B.G.\*, Mancuso, C.P.\*, Kiriakov, S., Bashor, C.J., **Khalil, A.S.** Precise, automated control of conditions for high-throughput growth of yeast and bacteria with eVOLVER. *Nature Biotechnology*, 36: 614-623 (2018).
  - **Journal Cover**
  - *Technology Feature*: May M. Automated science on a shoestring. *Nature*, 569 (2019).
29. Zheng, X.\*, Beyzavi, A.\*, Krakowiak, J., Patel, N., **Khalil, A.S.**<sup>†</sup>, Pincus, D.<sup>†</sup> Hsf1 phosphorylation generates cell-to-cell variation in Hsp90 levels and promotes phenotypic plasticity. *Cell Reports*, 22: 3099-3106 (2018).
30. Krakowiak, J.\*, Zheng, X.\*, Patel, N.\*, Feder, Z.A., Anandhakumar, J., Valerius, K., Gross, D.S.<sup>†</sup>, **Khalil, A.S.**<sup>†</sup>, Pincus, D.<sup>†</sup> Hsf1 and Hsp70 constitute a two-component feedback loop that regulates the yeast heat shock response. *eLife*, 7: e31668 (2018).
31. Newby, G.A.\*, Kiriakov, S.\*, Hallacli, E.\*, Kayatekin, C., Tsvetkov, P., Mancuso, C.P., Bonner, J.M., Hesse, W.R., Chakrabortee, S., Manogaran, A.L., Liebman, S.W., Lindquist, S., **Khalil, A.S.** A genetic tool to track protein aggregates and control prion inheritance. *Cell*, 171: 966-979 (2017).
  - **Journal Cover**
  - *Faculty of 1000*.
  - *Modus Operandi*: Williams R. Detecting protein clumps. *The Scientist* (1 February 2018).
32. Hawkins, F., Kramer, P., Jacob, A., Driver, I., Thomas, D.C., McCauley, K.B., Skvir, N., Crane, A.M., Kurmann, A.A., Hollenberg, A.N., Nguyen, S., Wong, B.G., **Khalil, A.S.**, Huang, S.X., Guttentag, S., Rock, J.R., Shannon, J.M., Davis, B.R., Kotton, D.N. Prospective isolation of NKX2-1-expressing human lung progenitors from pluripotent stem cells. *The Journal of Clinical Investigation*, 127: 2277-2294 (2016).
33. Pincus, D., **Khalil, A.S.** Heat shock signaling, fast and slow (In: Principles of systems biology, no. 12). *Cell Systems*, 3: 504-506 (2016).
34. Zheng, X.\*, Krakowiak, J.\*, Patel, N., Beyzavi, A., Ezike, J., **Khalil, A.S.**<sup>†</sup>, Pincus, D.<sup>†</sup> Dynamic

- control of Hsf1 during heat shock by a chaperone switch and phosphorylation. *eLife*, 5: e18638 (2016).
- *Insight*: Breton L. and Mayer M. A model for handling cell stress. *eLife*, 5 (2016).
35. Park, M., Keung, A.J., **Khalil, A.S.** The epigenome: the next substrate for engineering. *Genome Biology*, 17: 183 (2016).
  36. Mancuso, C.P., Kiriakov, S., **Khalil, A.S.** Cellular advantages to signaling in a digital world (Preview). *Cell Systems*, 3: 114-115 (2016).
  37. Garcia-Ojalvo, J., **Khalil, A.S.**, McCarthy, J. Biological insights from synthetic biology (Editorial). *Integrative Biology*, 8: 380-382 (2016).
  38. Keung, A.J., **Khalil, A.S.** A unifying model of epigenetic regulation (Perspective). *Science*, 351: 661-662 (2016).
  39. Lobritz, M.A., Belenky, P., Porter, C.B.M., Gutierrez, A., Yang, J.H., Schwartz, E.G., Dwyer, D.J., **Khalil, A.S.**<sup>†</sup>, Collins, J.J.<sup>†</sup>. Antibiotic efficacy is linked to bacterial cellular respiration. *Proc Natl Acad Sci USA*, 112: 8173-8180 (2015).
  40. Keung, A.J., Joung, J.K., **Khalil, A.S.**, Collins, J.J. Chromatin regulation at the frontier of synthetic biology. *Nature Reviews Genetics*, 16: 159-171 (2015).
  41. Keung, A.J., Bashor, C.J., Kiriakov, S., Collins, J.J., **Khalil, A.S.** Using targeted chromatin regulators to engineer combinatorial and spatial transcriptional regulation. *Cell*, 158: 110-120 (2014).
    - **Journal Cover**
    - *Research Highlight*: Burgess D.J. Gene regulation: a chromatin-based recruitment drive. *Nat. Rev. Genet.*, 15 (2014).
  42. Dwyer, D.J., Belenky, P., Yang, J.H., MacDonald, I.C., Martell, J.D., Takahashi, N., Chan, C.T.Y., Lobritz, M.A., Braff, D., Schwartz, E.G., Ye, J.D., Pati, M., Vercuysse, M., Ralifo, P.S., Allison, K.R., **Khalil, A.S.**, Ting, A.Y., Walker, G.C., Collins, J.J. Antibiotics induce redox-related physiological alterations as part of their lethality. *Proc Natl Acad Sci USA*, 111: E2100-9 (2014).
  43. Litcofsky, K.D., Afeyan, R.B., Krom, R.J., **Khalil, A.S.**<sup>†</sup>, Collins, J.J.<sup>†</sup> Iterative plug-and-play methodology for constructing and modifying synthetic gene networks. *Nature Methods*, 9: 1077-1080 (2012).
    - *News & Views*: Tabor J.J. Modular gene-circuit design takes two steps forward. *Nat. Methods*, 9 (2012).
  44. **Khalil, A.S.**<sup>\*</sup>, Lu, T.K.<sup>\*</sup>, Bashor, C.J.<sup>\*</sup>, Ramirez, C.L., Pyenson, N.C., Joung, J.K., Collins, J.J. A synthetic biology framework for programming eukaryotic transcription functions. *Cell*, 150: 647-658 (2012).
    - *Research Highlight*: Jones S. Expanding the engineer's toolkit. *Nat. Biotechnol.*, 30 (2012).
    - *Research Highlight*: Programming transcription. *Nat. Methods*, 9 (2012).
    - Highlighted in *Genetic Engineering & Biotechnology News* and *MIT News*.
  45. Vega, N.M., Allison, K.R., **Khalil, A.S.**, Collins, J.J. Signaling-mediated bacterial persister formation. *Nature Chemical Biology*, 8: 431-433 (2012).
    - **Journal Cover**
    - *Research Highlight*: Microbiology: bacteria signal to survive. *Nature*, 483 (2012).
    - *Editor's Choice*: Microbiology: bacteria hedge their bets. *Science*, 336 (2012).
    - *Research Highlight*: Jermy A. From indolence to persistence. *Nat. Rev. Microbiol.* 10 (2012).
    - *Research Highlight*: Signaling-mediated bacterial persister formation. *Nat. Med.*, 18 (2012).
    - Highlighted in *Chemical & Engineering News*.
  46. **Khalil, A.S.**, Collins, J.J. Synthetic biology: applications come of age. *Nature Reviews Genetics*, 11: 367-379 (2010).
    - **Journal Cover**
    - Highlighted in *The New York Times* and *Folha de S. Paulo*.
  47. Borenstein, J.T., Tupper, M.M., Mack, P.J., Weinberg, E.J., **Khalil, A.S.**, Hsiao, J., Garcia-Cardena, G. Functionalized endothelialized microvascular networks with circular cross sections in a tissue culture substrate. *Biomedical Microdevices*, 12: 71-79 (2010).

48. Lu, T.K., **Khalil, A.S.**, Collins, J.J. Next-generation synthetic gene networks. *Nature Biotechnology*, 27: 1139–1150 (2009).
49. **Khalil, A.S.**, Appleyard, D.C., Labno, A.K., Georges, A., Karplus, M., Belcher, A.M., Hwang, W., Lang, M.J. Kinesin's cover-neck bundle folds forward to generate force. *Proc Natl Acad Sci USA*, 105: 19247–19252 (2008).
50. **Khalil, A.S.**, Ferrer, J.M., Brau, R.R., Kottmann, S.T., Noren, C.J., Lang, M.J., Belcher, A.M. Single M13 bacteriophage tethering and stretching. *Proc Natl Acad Sci USA*, 104: 4892–4897 (2007).
  - *Journal Cover*
51. **Khalil, A.S.**, Bouma, B.E., Kaazempur-Mofrad, M.R. A combined FEM/genetic algorithm for vascular soft tissue elasticity estimation. *Cardiovascular Engineering*, 6: 93–102 (2006).
52. **Khalil, A.S.**, Chan, R.C., Chau, A.H., Bouma, B.E., Kaazempur-Mofrad, M.R. Tissue elasticity estimation with optical coherence elastography: toward complete mechanical characterization of in vivo soft tissue. *Annals of Biomedical Engineering*, 33: 1631–1639 (2005).
53. Chan, R.C., Chau, A.H., Karl, W.C., Nadkarni, S., **Khalil, A.S.**, Ifimia, N., Shishkov, M., Tearney, G.J., Kaazempur-Mofrad, M.R., Bouma, B.E. OCT-based arterial elastography: robust estimation exploiting tissue biomechanics. *Optics Express*, 12: 4532–4572 (2004).

### Invited Talks and Seminars

1. Invited Talk: Synthetic Biology for Future Health 2023, Wellcome Genome Campus, Hinxton, UK, 2023.
2. Invited Talk: Harvard SEAS Topics in Bioengineering, Harvard University, Cambridge, MA, USA, 2023.
3. Invited Talk: Chemistry Lecture Series, Boston College, Chestnut Hill, MA, USA, 2023.
4. Panelist: A Celebration of Synthetic Biology (Breakout Session: Accelerating Cell Design), HIVE, Harvard Medical School, Boston, MA, USA, 2022.
5. Invited Talk: BioE Seminar Series (sponsored by Center for Biomolecular and Tissue Engineering), Duke University, Durham, NC, USA, 2022.
6. Invited Talk: Department of Chemical Engineering, Louisiana State University, Baton Rouge, LA, USA, 2022.
7. Invited Talk: Department of Bioengineering, Rice University, Houston, TX, USA, 2022.
8. Invited Talk: EMBO Workshop: Modularity of Signaling Proteins and Networks, Seefeld in Tirol, Austria, 2022.
9. Invited Talk: Centre for Synthetic Biology Seminar Series, Imperial College London, UK, 2022.
10. Invited Talk: Yeast Genetics & Genomics CSHL Course, Cold Spring Harbor Laboratory, Cold Spring Harbor, NY, USA, 2022.
11. Invited Talk: Synthetic Biology CSHL Course, Cold Spring Harbor Laboratory, Cold Spring Harbor, NY, USA, 2022.
12. Invited Talk: Imperial College Centre for Synthetic Biology Seminar Series, Imperial College London, UK, 2022.
13. Invited Talk: Health Innovation Via Engineering (HIVE) Bioengineering Seminar Series, UCSF, San Francisco, CA, USA, 2022.
14. Invited Talk: Department of Pharmacology, Physiology & Neuroscience, Rutgers New Jersey Medical School, Newark, NJ, USA, 2022.
15. Invited Talk: Interdisciplinary Research Seminar, Institute for Biophysical Dynamics, University of Chicago, Chicago, IL, USA, 2022.
16. Invited Talk: Department of Microbiology, UMass Amherst, Amherst, MA, USA, 2022.
17. Invited Talk: Program in Systems Biology Seminar Series, UMass Medical School, Worcester, MA, USA, 2022.
18. Invited Talk: Bristol BioDesign International (BBI) Seminar Series, University of Bristol, Bristol, UK, 2022.
19. Invited Talk: Cell Circuits and Epigenomics Program Seminar Series, Broad Institute, Cambridge, MA, USA, 2022.

20. Invited Talk: International Mammalian Synthetic Biology Workshop, 2021.
21. Panelist: “Future and Opportunities in Synthetic Biology”, Synthetic Biology: Engineering, Evolution & Design (SEED), 2021.
22. Invited Seminar: Genentech Research and Early Development (gRED), Genentech, 2021.
23. Invited Talk: Donnelly Seminar Series, Donnelly Centre, University of Toronto, 2021.
24. Invited Talk: Department of Biochemistry, Boston University School of Medicine, Boston, MA, USA, 2021.
25. Invited Talk: EMBO/EMBL Symposium: Synthetic Morphogenesis: From Gene Circuits to Tissue Architecture, 2021.
26. Invited Talk: 2021 Keystone Symposia: Precision Engineering of the Genome, Epigenome and Transcriptome, 2021.
27. Invited Talk: Biophysical Society’s 65<sup>th</sup> Annual Meeting: Bioengineering Subgroup, 2021.
28. Invited Talk: 2021 Keystone Symposia: Emerging Cell Therapies: Realizing the Vision of NextGen Smart Cell Therapeutics for Disease, 2021.
29. Invited Talk: Pritzker School of Molecular Engineering (PME) Distinguished Colloquium Series, University of Chicago, Chicago, IL, USA, 2021.
30. Invited Talk: 1<sup>st</sup> International BioDesign Research Conference, Stanford University, Stanford, CA, USA, 2020.
31. Invited Talk: 4<sup>th</sup> International Conference on Epigenetics and Bioengineering (EpiBio 2020), North Carolina State University, Raleigh, NC, USA, 2020.
32. Invited Talk: q-Bio 2020: A Virtual Conference on Quantitative Biology, 2020.
33. Invited Talk: BME Higher Education and Research in a Pandemic-Challenged Environment, 2020 BME Council of Chairs Online Mini-Summit, 2020.
34. Invited Talk: BBC Seminar Series, Biophysics / Bioinformatics / Chemistry & Chemical Biology Graduate Programs, UCSF, San Francisco, CA, USA, 2019.
35. Invited Talk: BMG Seminar Series, Department of Biochemistry and Molecular Genetics, Feinberg School of Medicine, Northwestern University, Chicago, IL, USA, 2019.
36. Invited Talk: Molecular Engineering & Sciences (MoES) Seminar Series, University of Washington, Seattle, WA, USA, 2019.
37. Invited Talk: Department of Chemical and Biological Engineering, Tufts University, Medford, MA, USA, 2019.
38. Invited Talk: The Future of Quantitative Biology Symposium, NSF-Simons Center for Mathematical & Statistical Analysis of Biology, Harvard University, Cambridge, MA, USA, 2019.
39. Invited Talk: Bioengineering Seminar Series, University of Illinois at Urbana-Champaign, Urbana, IL, USA, 2019.
40. Invited Talk: Network Biology Meeting, Cold Spring Harbor Laboratory, Cold Spring Harbor, NY, USA, 2019.
41. Invited Talk: Bioengineering Lecture Series (BELS), Division of Biology and Biological Engineering, Caltech, Pasadena, CA, USA, 2019.
42. Invited Talk: Department of Biomedical Engineering, University of California, Irvine, CA, USA, 2019.
43. Invited Talk: 9<sup>th</sup> International Conference on Biomolecular Engineering (9<sup>th</sup> ICBE), Newport Beach, CA, USA, 2019.
44. Invited Talk: Sterling Drug Lecture. Pharmacological Sciences Seminar Series, Program in Biomolecular Pharmacology, Department of Pharmacology & Experimental Therapeutics, Boston University School of Medicine, Boston, MA, USA, 2018.
45. Invited Talk: BioEngineering Seminar, Center for Biomolecular and Tissue Engineering, Duke University, Durham, NC, USA, 2018.
46. Invited Talk: 2<sup>nd</sup> International Conference on Epigenetics and Bioengineering (EpiBio 2018), UCSF, San Francisco, CA, USA, 2018.
47. Invited Talk: Department of Biomedical Engineering, Boston University, Boston, MA, USA, 2018.
48. Invited Talk: Department of Chemical & Biological Engineering, Northwestern University, Evanston, IL, USA, 2018.
49. Invited Talk: Biotechnology Training Program (BTP) Seminar Series, Advances in Biotechnology, Northwestern University, Evanston, IL, USA, 2018.

50. Invited Talk: Engineering Biology Research Consortium (EBRC) Spring Retreat, University of Washington, Seattle, WA, USA, 2018.
51. Invited Talk: Center for Molecular Discovery, Boston University, Boston, MA, USA, 2018.
52. Invited Talk: Department of Genetics & Development, Columbia University Medical Center, New York, NY, USA, 2018.
53. Keynote Talk: Quantitative Biology Boot Camp, Quantitative Biology Program, Brandeis University, Waltham, MA, USA, 2018.
54. Invited Talk: Department of Biomedical Engineering, Cornell University, Ithaca, NY, USA, 2017.
55. Invited Talk: The BioTechnology Institute Seminar Series, University of Minnesota, St Paul, MN, USA, 2017.
56. Invited Talk: Gene Expression and RNA Series (GEARS), Harvard Medical School, Boston, MA, USA, 2017.
57. Invited Talk: The Hartwell Foundation 10<sup>th</sup> Annual Meeting, Duke University, Durham, NC, USA, 2017.
58. Invited Talk: Synthetic Biology at Molecular, Cellular and Multicellular Levels (International Workshop Organized by WISB), Venice, Italy, 2017.
59. Invited Talk: Draper Laboratory, Cambridge, MA, USA, 2017.
60. Invited Talk: Green Center for Systems Biology Seminar, UT Southwestern Medical Center, Dallas, TX, USA, 2017.
61. Invited Talk: Gordon Research Conference (GRC) on Synthetic Biology, Stowe, VT, USA, 2017.
62. Invited Talk: Synthetic Biology: Engineering, Evolution & Design (SEED), Vancouver, British Columbia, Canada, 2017.
63. Invited Talk: Integrative BioSystems Institute Seminar Series, Department of Biomedical Engineering, Georgia Institute of Technology, Atlanta, GA, USA, 2017.
64. Invited Talk: Center for Engineering in Medicine (CEM) Seminar Series, Massachusetts General Hospital, Harvard Medical School, Boston, MA, USA, 2017.
65. Invited Talk: Genome Editing and Advances in Transgenic Technology USA Congress, Harvard Medical School, Boston, MA, 2017.
66. Invited Talk: Department of Chemical and Systems Biology, Stanford University School of Medicine, Stanford, CA, USA, 2017.
67. Invited Talk: Department of Bioengineering, University of California, Berkeley, CA, USA, 2017.
68. Invited Talk: Department of Bioengineering, University of Pennsylvania, Philadelphia, PA, USA, 2017.
69. Invited Talk: School of Biological and Health Systems Engineering, Arizona State University, Tempe, AZ, USA, 2017.
70. Invited Talk: The Hartwell Foundation 9<sup>th</sup> Annual Meeting, Cleveland Clinic / Case Western University, Cleveland, OH, USA, 2016.
71. Invited Talk: Physiology: Modern Cell Biology Using Microscopic, Biochemical and Computational Approaches, Marine Biological Laboratory, Woods Hole, MA, USA, 2016.
72. Invited Talk: Warwick Integrative Synthetic Biology Centre Launch Event, University of Warwick, Coventry, UK, 2016.
73. Invited Talk: LabLinks: Gene Circuits, Co-sponsored by Cell Press and the Center for Cell Circuits, Broad Institute, Cambridge, MA, USA, 2016.
74. Invited Talk: Theory Lunch, Department of Systems Biology, Harvard Medical School, Boston, MA, USA, 2016.
75. Invited Talk: Department of Biomedical Engineering, Johns Hopkins University, Baltimore, MD, USA, 2015.
76. Invited Talk: Department of Molecular Microbiology and Immunology, Brown University, Providence, RI, USA, 2015.
77. Invited Talk: Lab-on-a-chip, Microfluidics & Microarrays World Congress, San Diego, CA, USA, 2015.
78. Invited Talk: Synthetic Biology: From Standard Biological Parts to Artificial Life, B-Debate International Center for Scientific Debate, Barcelona, Spain, 2015.
79. Invited Talk: Synthetic Biology CSHL Course, Cold Spring Harbor Laboratory, Cold Spring Harbor, NY, USA, 2015.



80. Invited Talk: EpiCongress 2015, Boston, MA, USA, 2015.
81. Invited Talk: Gene Regulation by the Numbers, Radcliffe Institute for Advanced Study, Harvard University, Cambridge, MA, USA, 2015.
82. Invited Talk: Department of Physiology & Biophysics, Boston University School of Medicine, Boston, MA, USA, 2015.
83. Guest Lecture: MCB 187: Genome Editing – Progress and Frontiers (Spring 2015), Department of Molecular and Cellular Biology, Harvard University, Cambridge, MA, USA, 2015.
84. Invited Talk: Biophysics Seminar Series, MIT, Cambridge, MA, USA, 2014.
85. Invited Talk: Bioengineering Lecture Series, California Institute of Technology, Pasadena, CA, USA, 2014.
86. Invited Talk: Cell Circuits & Epigenomics Seminar, Broad Institute, Cambridge, MA, USA, 2014.
87. Invited Talk: Meeting for the Mérieux Research Grants, Annecy, France, 2014.
88. Invited Talk: Departments of Biology and Biochemistry, Genetics Training Grant Symposium (Synthetic Biology: Insights and Applications), Brandeis University, Waltham, MA, USA, 2014.
89. Invited Talk: 7<sup>th</sup> World Congress of Biomechanics, Boston, MA, USA, 2014.
90. Invited Talk: Towards Next Generation Synthetic Biology, University of Warwick, Coventry, UK, 2013.
91. Invited Talk: Materials Research Science and Engineering Center (MRSEC) Seminar, Brandeis University, Waltham, MA, USA, 2013.
92. Invited Talk: Precision Genome Engineering and Synthetic Biology, Keystone Symposia, Breckenridge, CO, USA, 2013.
93. Invited Talk: Department of Molecular & Cell Biology, Boston University School of Dental Medicine, Boston, MA, USA, 2013.
94. Invited Talk: Department of Biology and Program in Molecular Biology, Cell Biology & Biochemistry, Biomolecular Seminar Series, Boston University, Boston, MA, USA, 2012.
95. Invited Talk: Synthetic Biology Working Group, Harvard Medical School, Boston, MA, USA, 2012.
96. Invited Plenary Talk: Italian Federation of Life Sciences (FISV) 12<sup>th</sup> Congress, Rome, Italy, 2012.
97. Invited Talk: Department of Biomedical Engineering, Boston University, Boston University, Boston, MA, USA, 2011.
98. Invited Talk: Department of Pharmaceutical Chemistry, UCSF, San Francisco, CA, USA, 2011.
99. Invited Talk: Departments of Chemical Engineering, Biomedical Engineering, and Cell Biology, Yale University, New Haven, CT, USA, 2011.
100. Platform Presentation: NASA Ames Research Center, Moffett Field, CA, USA, 2010.
101. Invited Talk: Center for Excellence in Vascular Biology Seminar Series, Harvard Medical School, Brigham & Women’s Hospital, Boston, MA, USA, 2010.
102. Invited Talk: Harvard Single Molecule Discussion Group, Cambridge, MA, USA, 2008.
103. Invited Talk: Mechanics: Modeling, Experimentation, Computation Seminar Series, Department of Mechanical Engineering, MIT, Cambridge, MA, USA, 2008.
104. Invited Talk: Biomechanical Engineering Seminar Series, Department of Mechanical Engineering, Stanford University, Stanford, CA, USA, 2008.
105. Platform Presentation: Biophysical Society Annual Meeting, Long Beach, CA, USA, 2008.
106. Platform Presentation: Biophysical Society Annual Meeting, Salt Lake City, UT, USA, 2006.

## Patent Applications

1. “Cas9 Variants Having Non-Canonical PAM Specificities and Uses Thereof.” Provisional Patent Application No. 63/327,354 (April 4, 2022) and 63/396,943 (August 10, 2022).
2. “Notch Receptors with Zinc Finger-Containing Transcriptional Effector.” Patent Application No. PCT/US2020/052244 (September 23, 2020).
3. “Regulated Synthetic Gene Expression Systems.” Patent Application No. US 2020/0377564 A1 (December 3, 2020).
4. “Methods for Experimental Evolution of Natural and Synthetic Microbes.” Patent Application Publication No. US 16/081,975 (February 17, 2017) and WO 2018/152442 A1 (August 23, 2018).

## Patents Issued

5. “Systems and Methods for Control of Gene Expression.” Patent Application No. US 16/456,556 (June 28, 2019) and WO 2020/006409 A1 (January 2, 2020).
6. “An Integrated System for Programmable DNA Methylation.” Patent No. US 10,465,187 B2 (November 5, 2019) and WO 2018/145068 A1 (August 9, 2018).
7. “Synthetic Transcriptional and Epigenetic Regulators Based on Engineered, Orthogonal, Zinc Finger Proteins.” Patent No. US 10,138,493 B2 (November 27, 2018) and WO 2018/039471 A2 (March 1, 2018).
8. “Method of Fabricating Microfluidic Structures for Biomedical Applications.” Patent No. US 8,266,791 B2 (September 18, 2012), WO 2009/039378 A2 (March 26, 2009), and EP 2 200 931 B1 (June 7, 2017).
9. “High-Throughput Biological Screening.” Patent No. US 9,006,149 B2 (April 14, 2015), WO 2010/083282 A1 (July 22, 2010), and EP 2 382 305 B1 (July 24, 2014).

## Training, Teaching, Outreach, and Professional Service

*Training & mentoring.* I have served as primary research mentor for 15 postdoctoral associates (6 former), 24 PhD students (13 former, 11 current), 3 MS students, and 33 undergraduate and high school students. Former group members have gone on to a wide range of academic and industrial positions, six of whom have established independent academic labs as faculty members. I am the Founding Associate Director of the Biological Design Center (BDC) at Boston University, where I oversee research and training programs in synthetic biology and bioengineering. I have strived to evolve outdated academic training models, especially for trainees interested in undertaking multi-disciplinary research. Notably, I led the successful application and currently serve as Co-Director for the nation’s first NIH/NIGMS T32 PhD Training Program in synthetic biology (<https://sites.bu.edu/sb2/>). Using synthetic biology as a vehicle, I am establishing training models that integrate internships, ethics training, and professional development skills. These models are tailored for interdisciplinary fields, attuned to the needs of society, and designed to increase diversity in biotechnology. I am always striving to improve my mentorship and advocacy through DEI theory and practice. I was a member of the inaugural class of Boston University’s Provost Mentor Fellows Program, which included hands-on workshops and discussions on topics giving and receiving feedback, culturally aware mentoring, and effective mentoring practices.

*Teaching.* Altogether, I have taught 1080 undergraduate and 107 graduate students in the classroom, across a variety of new and existing courses. At the undergraduate level, I have taught two foundational, required courses: Biomedical Signals & Systems (BE403) and Thermodynamics & Statistical Mechanics (EK424). At the graduate level, I co-developed and introduced a new course, Methods & Logic in Quantitative Biology (BE700), which focuses on critical reading and discussion of published papers across diverse areas of biology that lie at the interface of theory/quantitative approaches and experimentation. I have implemented innovative and active learning approaches in my courses. In recognition of my teaching achievements, I have been fortunate to receive the Department Award for Teaching Excellence three times (2016, 2015, 2013), an honor that is especially meaningful to me because students select the recipient. I have also received the Outstanding Professor of the Year for the College of Engineering (2016), and was invited to both National Academy of Engineering (NAE) Frontiers in Engineering Education (2014) and Frontiers in Engineering (2018) Symposia.

*Outreach.* My robust outreach activities aim to encourage young students to pursue STEM careers. They include hosting undergraduates in mentored laboratory experiences, establishing a summer bootcamp for high school students to gain experiential training in molecular and synthetic biology, mentoring award-winning iGEM (International Genetically Engineered Machine) undergraduate teams, and serving as instructor of the Cold Spring Harbor Laboratory Course on synthetic biology (2016). Most recently, I was part of a team that was awarded a DoD STEM grant to develop a Boston-wide high school education and outreach program for students that are underrepresented minorities in STEM, enabling us to create a collection of yearly activities, including networking events, short courses, lab rotations, and industrial internships.

*Democratizing science.* Academic researchers broaden their impact on society when they share their tools with the rest of the world, democratizing access to science and unleashing creativity. Unlike conventional laboratory hardware—which is often proprietary and expensive, with limited opportunities to generate new applications—our eVOLVER platform is a low-cost open-source bioreactor system, designed to promote wide adoption, rapid customization, and reproducible and scalable scientific processes. eVOLVER has been delivered to and used by over 50 (and counting) academic and industrial labs worldwide, resulting in experiments undreamt of at the time of its creation. To support this open-source enterprise, my team has developed online forums to train users and share methods and data generated ([www.evolver.bio](http://www.evolver.bio) and [www.github.com/fynch-bio](http://www.github.com/fynch-bio))

*Professional service.* My service and leadership roles in the community include serving as Chair of the Gordon Research Conference (GRC) on Synthetic Biology, Chair of the International Mammalian Synthetic Biology Workshop (mSBW), and Founding Chair of the International Conference on Epigenetics and Bioengineering (EpiBio), as well as co-organizer of many other major meetings, such as SEED (Synthetic Biology, Engineering, Evolution & Design). As an Academic Member of the Engineering Biology Research Consortium (EBRC), I serve on the Research Roadmapping working group where I contributed to the development of the first “Engineering Biology Roadmap”. I was elected to the AIMBE College of Fellows. In addition, I am a member of the Board of Reviewing Editors for *eLife* and serve as editorial board member for other major journals, including *Molecular Systems Biology*. At Boston University, I am the Founding Associate Director of a university-wide research center in synthetic biology, the nBiological Design Center (BDC), where I am leading the effort to recruit and support students, postdocs, and faculty from diverse backgrounds.

### **Academic Service at the Departmental, College and Campus Levels**

2022–23	Co-Chair, Biological Design Center Faculty Search Committee, Boston University
2022–23	Member, Taskforce on the Future of PhD Education at Boston University, Boston University
2021–22	Member, Appointments & Promotions (APT) Committee, College of Engineering, Boston University
2021–22	Member, Biomedical Engineering Faculty Search Committee, Boston University
2021–24	Faculty Review Committee for Research Conflicts of Interest, Boston University
2021–22	Faculty Adviser, Society of Asian Scientists & Engineers, Boston University
2020–21	Initiative Owner, Strategy Implementation Group, Boston University Strategic Plan For 2030
2020–21	Co-Chair, Biological Design Center Faculty Search Committee, Boston University
2020–21	Member, Biomedical Engineering Undergraduate Committee, Boston University
2020–21	Faculty Adviser, Society of Asian Scientists & Engineers, Boston University
2019–20	Provost Faculty Mentor Fellows Program, Boston University
2019–	Co-Director, Synthetic Biology & Biotechnology (SB2) NIH/NIGMS T32 PhD Training Program
2019–20	Faculty Adviser, Society of Asian Scientists & Engineers, Boston University
2018–19	Chair, Biological Design Center Faculty Search Committee, Boston University
2018–19	Member, Biomedical Engineering Undergraduate Committee, Boston University
2018–19	Faculty Adviser, Society of Asian Scientists & Engineers, Boston University
2017–18	Member, Biomedical Engineering Undergraduate Committee, Boston University
2017–18	Faculty Adviser, Society of Asian Scientists & Engineers, Boston University
2016–17	Member, Biomedical Engineering Faculty Search Committee, Boston University
2016–17	Member, Biomedical Engineering Undergraduate Committee, Boston University
2016–17	Faculty Adviser, Society of Asian Scientists & Engineers, Boston University
2015–	Associate Director and Founding Member, Biological Design Center, Boston University
2015–16	Member, Biomedical Engineering Faculty Search Committee, Boston University
2015–16	Faculty Adviser, Society of Asian Scientists & Engineers, Boston University
2014–15	Member, Biomedical Engineering Faculty Search Committee, Boston University
2014–15	Member, Biomedical Engineering Undergraduate Committee, Boston University
2014–15	Faculty Adviser, Society of Asian Scientists & Engineers, Boston University
2013–14	Member, Biomedical Engineering Undergraduate Committee, Boston University
2013–14	Faculty Adviser, Society of Asian Scientists & Engineers, Boston University
2012–13	Member, Biomedical Engineering Undergraduate Committee, Boston University
2012–13	Member, Biomedical Engineering Graduate Admissions Committee, Boston University

## Professional Service at the National and International Levels

- 2023 Chair, Gordon Research Conference (GRC) on Synthetic Biology
- 2022 Organizing Committee, Synthetic Biology: Engineering, Evolution & Design (SEED), Arlington, VA, USA
- 2022 Organizing Committee, International Mammalian Synthetic Biology Workshop, Edinburgh, UK
- 2021 Review Committee for the 2022 Class of the College of Fellows, AIMBE Molecular Engineering, Synthetic Biology, and Drug Delivery
- 2021 Organizing Committee, 11<sup>th</sup> International Conference on Biomolecular Engineering, Santa Barbara, CA, USA
- 2021 NIH Review Panelist, Special Emphasis Panel ZCA1 TCRB-Q (A1)
- 2021 Organizing Committee, Virtual International Mammalian Synthetic Biology Workshop
- 2020 NIH/NIGMS Review Panelist, Special Emphasis Panel ZGM1 TWD-5 (KR)
- 2020 NIH Study Section Cellular and Molecular Technologies (CMT) (Ad-hoc member)
- 2019 Steering Committee, The Role of Synthetic Biology in Atmospheric Greenhouse Gas Reduction: Prospects and Challenges (Alfred P. Sloan Foundation), Boston University, Boston, MA USA
- 2019 Co-Author, EBRC Engineering Biology Roadmap (A Research Roadmap for the Next-Generation Bioeconomy)
- 2019 Vice Chair, Gordon Research Conference (GRC) on Synthetic Biology
- 2019 NSF Advisory Panelist, Panel 191842, EFRI: Chromatin and Epigenetic Engineering
- 2019 Co-Chair, International Mammalian Synthetic Biology Workshop 6.0, Northwestern University, Evanston, IL, USA
- 2018 Organizing Committee, Synthetic Biology: Engineering, Evolution & Design (SEED), Scottsdale, AZ, USA
- 2018 Chair, International Mammalian Synthetic Biology Workshop, Harvard Medical School, Boston, MA, USA
- 2018– Academic Member, Engineering Biology Research Consortium (EBRC)
- 2018 Organizing Committee, 2<sup>nd</sup> International Conference on Epigenetics and Bioengineering (EpiBio 2018), UCSF, San Francisco, CA, USA
- 2017 Chair, International Mammalian Synthetic Biology Workshop, Boston University, Boston, MA USA
- 2017 Chair, 1<sup>st</sup> International Conference on Epigenetics and Bioengineering (EpiBio 2017), Miami, FL, USA
- 2016 Co-Chair, International Mammalian Synthetic Biology Workshop, MIT, Cambridge, MA, USA
- 2016 Instructor, Cold Spring Harbor Laboratory Course on Synthetic Biology, Cold Spring Harbor, NY, USA
- 2016 Guest Editor, *Integrative Biology* special themed issue on Synthetic Biology (8: 380-382 (2016))
- 2015 Workshop Invitee, “Gene Regulation by the Numbers”, Radcliffe Institute for Advanced Study, Harvard University, Cambridge, MA, USA
- 2015 Organizing Committee, International Mammalian Synthetic Biology Workshop, MIT, Cambridge, MA, USA.
- 2015 Organizing Committee, B-Debate International Center for Scientific Debate Meeting on Synthetic Biology, Barcelona, Spain
- 2014 NIH/NIGMS Review Panelist, Special Emphasis Panel ZGM1 PPBC-Y(GN)
- 2014 Organizing Committee, Synthetic Biology Boston (SB2), Boston University, Boston, MA, USA
- 2014 NSF Advisory Panelist, Panel P140678, Division of Molecular and Cellular Biosciences
- 2013 Organizing Committee, Towards Next Generation Synthetic Biology, University of Warwick, UK
- 2013 Organizing Committee, Synthetic Biology Research & Innovation Partnership Campaign (US-UK Partnerships in Synthetic Biology), Boston University & UK Consulate, Boston, MA, USA
- 2013 NIH/NIGMS Review Panelist, Special Emphasis Panel ZGM1 PPBC-A (NP).
- 2013 Organizing Committee & Session Chair, 4<sup>th</sup> International Conference on Biomolecular Engineering, Fort Lauderdale, FL, USA
- 2010 Workshop Invitee, “What Are the Potential Roles for Synthetic Biology in NASA’s Mission?” NASA Ames Research Center, Moffett Field, CA, USA

## Professional Societies

Biophysical Society (BPS)

Engineering Biology Research Consortium (EBRC)  
Biomedical Engineering Society (BMES)

## Editorial Board

eLife (Board of Reviewing Editors), Molecular Systems Biology, iScience (Cell Press), Scientific Reports (Nature)

## Archival Journals Refereed (selected)

ACS Synthetic Biology, ACS Chemical Biology, APL Bioengineering, Biophysical Journal, Biotechnology Journal, Cell, Cell Chemical Biology, Cell Reports, Cell Systems, eLife, Frontiers in Antimicrobials, G3: Genes Genomes Genetics, Journal of Biological Engineering, Journal of Visualized Experiments, Molecular Biosystems, Molecular Cell, Nature Biomedical Engineering, Nature Biotechnology, Nature Chemical Biology, Nature Communications, Nature Methods, Nature Nanotechnology, Nature Protocols, Nucleic Acids Research, PLoS Computational Biology, PNAS, Resistance and Chemotherapy, Science

## Teaching

*Boston University, Department of Biomedical Engineering*

Term	Subject Number	Title	Role (Evaluation)	Type / # of Students
Fall 2012	EK424	Thermodynamics & Statistical Mechanics	Instructor (4.82/5.00) <b>AWARD</b>	Lecture / 78 Ugrad
Spring 2014	EK424	Thermodynamics & Statistical Mechanics	Instructor (4.92/5.00)	Lecture / 81 Ugrad
Fall 2014	BE700	Methods and Logic in Quantitative Biology	Instructor (N/A) <b>NEW COURSE</b>	Discussion / 11 Grad
Fall 2014	EK424	Thermodynamics & Statistical Mechanics	Instructor (4.85/5.00)	Lecture / 87 Ugrad
Spring 2015	BE402	Control Systems in Biomedical Eng.	Instructor (4.84/5.00) <b>AWARD</b>	Lecture / 130 Ugrad
Spring 2016	EK424	Thermodynamics & Statistical Mechanics	Instructor (4.73/5.00) <b>AWARD</b>	Lecture / 74 Ugrad
Spring 2016	BE402	Control Systems in Biomedical Eng.	Instructor (4.54/5.00) <b>AWARD</b>	Lecture / 110 Ugrad
Spring 2017	BE402	Control Systems in Biomedical Eng.	Instructor (4.49/5.00)	Lecture / 154 Ugrad
Spring 2018	BE700	Methods and Logic in Quantitative Biology	Instructor (4.95/5.00)	Discussion / 22 Grad
Fall 2018	BE403	Biomedical Signals and Controls	Co-Instructor (4.23/5.00)	Lecture / 142 Ugrad
Spring 2020	BE700	Methods and Logic in Quantitative Biology	Instructor (4.95/5.00)	Discussion / 26 Grad
Fall 2020	BE403	Biomedical Signals and Controls	Instructor (4.65/5.00)	Lecture / 121 Ugrad
Spring 2021	BE700	Methods and Logic in Quantitative Biology	Instructor (5.00/5.00)	Discussion / 24 Grad
Fall 2021	BE403	Biomedical Signals and Controls	Instructor	Lecture / 103 Ugrad

## Current & Past Postdoctoral Fellows Advised

Name	Prior Universities	Training Period	Current Position
<b>Current Postdoctoral Fellows</b>			
Giulio Chiesa	IRB Barcelona (PhD) University of Pavia (BS, MS)	2016–	

Hui-Shan Li	Seoul National (PhD) Tianjin University (BS)	2016–	
Brandon Wong	Boston University (PhD) UC Irvine (BS)	2019–	
Arjun Ravikumar	UC Irvine (PhD) Caltech (BS)	2019–	
James Angstman	Harvard University (PhD) University of Minnesota (BS)	2020–	
William Shaw	Imperial College London (PhD) University of Sheffield (BS)	2020–	
Hagar Moussa	Universität Wien, IMBA (PhD) Universität Heidelberg (MS) German University Cairo (BS)	2020–	
Michael Raymond	University of Virginia (PhD) University of South Carolina (BS)	2021–	
Heidi Klumpe	Caltech (PhD) North Carolina State (BS)	2021–	
<b>Past Postdoctoral Fellows</b>			
Albert Keung	UC Berkeley (PhD) Stanford University (BS)	2012–2015	Assistant Professor, Chemical & Biomolecular Engineering, NC State University
Zehua Bao	University of Illinois Urbana-Champaign (PhD) Tsinghua University (BS)	2018–2020	Assistant Professor, Institute of Bioengineering, College of Chemical and Biological Engineering, Zhejiang University
Marco Galardini	EMBL-EBI (Postdoc) University of Florence (PhD, BS)	2019–2020	Associate Professor in Systems Biology of Microbial Communities, Helmholtz Centre for Infection Research, Hannover Medical School
Sungho Jang	POSTECH (Postdoc) POSTECH (PhD, BS)	2019–2020	Assistant Professor, Division of Bioengineering, Incheon National University, Korea
Allison Drain	UC Berkeley / UCSF (PhD) University of Nebraska-Lincoln (BS)	2020–2021	Scientist II, Affini-T Therapeutics

### Current & Past Graduate Students Advised

Name	Prior Universities	Degree / Dept / Yr	Current Position
<b>Current PhD Students</b>			
Meghan Bragdon	Stonehill College (BA) NYU (Post-bac)	PhD / MCBB / -	
Keith Gagnon	Worcester Polytechnic Institute	MD-PhD / BME / -	
Kok Ann (Sam) Gan	Illinois Tech UW Madison	PhD / MCBB / -	
Zachary Heins	Georgetown (MS) UT Dallas (BS)	PhD / BME / -	
Colin Kunze	USC (BS)	PhD / BME / -	
Daniel Hart	Stanford University (BS)	PhD / BME / -	
Adam Sanford	Northeastern University (BS)	PhD / BME / -	
Ezira Yimer Wolle	Boston University (BS)	PhD / BME / -	
Charles Jo	Boston University (MS) Duke University (BS)	PhD / BME / -	
Nathaniel	University of Delaware (BS)	PhD /	

Borders		Bioinformatics / -	
Past PhD Students			
Ali Beyzavi	Nanyang University (MS) Azad University (BS)	PhD / ME / 2016	Scientist, Roche
Saloni Jain	MIT (BS)	PhD / BME / 2017	Associate Principal, Eversana Life Science Services
Gregory Newby	Carnegie Mellon (BS)	PhD (MIT) / Biology / 2017	Postdoc, Broad Institute / Harvard (Lab of David Liu)
Dana Braff	MIT (BS)	PhD / BME / 2017	Principal Scientist, GRO Biosciences
Szilvia Kiriakov	Budapest University of Technol. & Econ. (MS, BS)	PhD / MCBB / 2018	Senior Computational Biologist, Asimov Inc.
Brandon Wong	UC Irvine (BS)	PhD / BME / 2018	Co-Founder, Fynch Bio and K2 Biotechnologies Postdoc, Biomedical Engineering, BU (Lab of Mo Khalil)
Nikit Patel	UC Berkeley (BS)	PhD / BME / 2018	Postdoc, Systems Biology, HMS (Lab of Allon Klein)
Minhee Park	Rice University (BS)	PhD / BME / 2019	Assistant Professor, Biological Sciences, KAIST
Christopher Mancuso	Cornell University (BS)	PhD / BME / 2020	Postdoc, Civil and Environmental Engineering / IMES, MIT (Lab of Tami Lieberman)
Divya Israni	UC Berkeley (BS)	PhD / BME / 2020	Scientist, Satellite Bio
Emma Briars	Boston University (BA)	PhD / Bioinformatics / 2022	Computational Biologist, Day Zero Diagnostics

### Current & Past Undergraduate & High School Students Advised

Current Students					
Name	School	Years / Distinction	Name	School	Years / Distinction
Paarth Patel	Boston University	2020–	Blaire Smith	Boston University	2020– / UROP
Emily Oros	Boston University	2021–			

Past Students					
Name	School	Years / Distinction	Name	School	Years / Distinction
Nora Pyenson	Boston University	2012	Max Cotler	Boston University	2012–2014 / Presidential Scholarship, UROP
Cathryn Hart	Boston University Academy (HS)	2012–2014 / HS Thesis	Davis Borucki	Boston University	2013–2014 / Trustee Scholarship, UROP
Madeleine Joung	Boston University Academy (HS)	2014–2016 / HS Thesis	Rachel Petherbridge	William G. Enloe HS (Raleigh, NC)	2014 / RISE Program
Samantha Pipe	Boston University	2014–2015 / UROP, Lutchen Distinguished Fellow	Amir Soltanianzadeh	Boston University	2014–2016 / UROP
Rishi Jain	Boston University	2014–2015 / Presidential Scholar., UROP	Andrew Montequin	Caltech	2015 / Caltech SURF Program
Hannah Vanbenschoten	Boston University	2015–2016 / Presidential Scholar., UROP	Aditya Cavale	Boston University	2015–2017 / UROP, STARS
Alexander Sun	Boston University	2015–2018 / UROP	Maxime Fouilleron	French-American School of NY	2016
Rachel Petherbridge	Boston University	2016–2019 / Presidential Scholarship, Goldwater Scholarship, Harvard Amgen Scholar, Lutchen Fellow, Mitchell Scholar	Michelle Rose	Boston University	2016–2017
Teja Karri	Boston University	2017	Grace Qian	Dover-Sherborn HS	2017
Shaan Bhandarkar	Phillips Exeter Academy HS	2017	Benjamin Chew	Boston University	2016–2018 / UROP
Kevin Lorch	Boston University	2017–2019	Erdene Galbadrakh	Boston University	2017–2019 / UROP
Louisa	University of	2018	Connor (Cass)	Boston University	2019

Brenninkmeijer	Birmingham (UK)	
Akhila Sonti	Boston University	2018–2020 / UROP
Leen Arnaout	Boston University	2019–2021 / UROP, Lutchen Distinguished Fellow
Shuwen (Eric) Lee	Boston University	2019–2021 / UROP

Leach		
Pallavi Balivada	Boston University	2018–2021 / Presidential Scholarship, UROP, STARS, Lutchen Distinguished Fellow
Jack Cardini	Boston University	2019–2021 / UROP

### **Boston University Senior Design Project Teams Mentored**

- 2013–2014 “A universal system for high-throughput loading of microfluidic devices”  
Rami Barghout, Traci Kent, Oussama Benjelloun Touimi
- 2014–2015 “A modular system for optical measurement of pH in a continuous culture turbidostat”  
Alan Pacheco, Juliann Tefft, Hallie Thorp
- 2014–2015 “Fluorescence measurement in a high throughput turbidostat platform”  
Zhi Jiao, Harsh Patel, Jean-Marc Tsang
- 2017–2018 “Ergonomic design and prototype of next generation culture devices”  
Henok Haile, Jakov Kendes, John Le, Mark Viteri
- 2019–2020 “AnaevolVER: Developing high-throughput fluidic and gas control modules to grow, evolve and study anaerobic microbiomes”  
Gordon Ellis, Katherine Hastie, Griffen Larkin, Christopher LaRoche, Jai Singh
- 2019–2020 “Developing a 4OHT inducible therapeutic genetic circuit for reversing tauopathy in Alzheimer disease model”  
Nouf Alharbi, Zhonghao Dai, Shuwen (Eric) Lei
- 2021–2022 “Designing, modeling, and constructing coherence detection synthetic gene circuits based on protein oligomerization”  
Emily Hill, Blaire Smith, Delaney Dow, Hannah Collins

### **International Genetically Engineered Machine (iGEM) Teams Mentored**

- 2015 Jeffrey Chen, Abha Patil, Shaheer Piracha, Kate Ryan, Nicholas Salvador, John Viola
- 2016 William Benman, Kami Drezek, Jeffrey Marano, Marisa Mendes, Rachel Petherbridge
- 2018 Connor (Cass) Leach, Kevin Lorch, Linda Luo

### **Doctoral Theses**

- 2023 Thesis Committee Member: Chloe Ding, “Orthogonal Inducible Control of Cas13 Circuits Enables Programmable RNA Regulation in Mammalian Cells,” Department of Biomedical Engineering, Boston University. (Advisor: Dr. Wilson Wong).
- 2023 Thesis Committee Chair: Eric Bressler, “Engineering Biomaterial-Enhanced Therapeutics to Control Locally Aggressive Malignancies,” Department of Biomedical Engineering, Boston University. (Advisors: Drs. Mark Grinstaff and Wilson Wong)
- 2023 Thesis Committee Chair: Nathan Tague, “Utilizing Light as an Input and Output for Synthetic Biology and Metabolic Engineering,” Department of Biomedical Engineering, Boston University. (Advisor: Dr. Mary Dunlop)
- 2023 Thesis Committee Member: Mark S. Aronson, “Biophysical Methods Bridging Signal Pathway Architecture and Dynamics in Multigenerational Bacterial Processes,” Department of Biomedical Engineering, Boston University. (Advisor: Dr. Allyson Sgro).



- 2022 Thesis Committee Member (MS): Priyam S. Ambastha, “Developing a Microfluidic Device for Detecting Antibiotic Tolerance in Bacteria,” Department of Biomedical Engineering, Boston University. (Advisor: Dr. Christine McBeth).
- 2022 Thesis Committee Member: Sean F. Sullivan, “Regulon Engineering for the Assimilation of Non-Native Carbon Sources in *Saccharomyces cerevisiae*,” Biotechnology Engineering, Tufts University. (Advisor: Dr. Nikhil Nair)
- 2022 Thesis Advisor: Zachary J. Heins, “Development of the eVOLVER Continuous Culture Platform for High-Throughput Phage-Assisted Continuous Evolution,” Department of Biomedical Engineering, Boston University.
- 2022 Thesis Advisor: Meghan D.J. Bragdon, “Cooperative Assembly Confers Regulatory Specificity and Promotes Evolution,” Molecular Biology, Cell Biology & Biochemistry Program, Boston University.
- 2022 Thesis Committee Chair: Elena Forchielli, “Metabolic Phenotypes of Marine Heterotrophic Bacteria,” Molecular Biology, Cell Biology & Biochemistry Program, Boston University. (Advisor: Dr. Daniel Segrè).
- 2022 External PhD Examiner: Tiasha Ayumi Shafiq, “Locus-Dependent Epigenetic Inheritance of Polycomb-Mediated Gene Silencing,” Biological and Biomedical Sciences, Division of Medical Sciences, Harvard University. (Advisor: Dr. Danesh Moazed).
- 2022 Thesis Committee Member: Seunghee Lee, “Engineering Inhibitory Chimeric Antigen Receptor for Adoptive T Cell and NK Cell Therapy,” Department of Biomedical Engineering, Boston University. (Advisor: Dr. Wilson Wong).
- 2022 External PhD Examiner: Nader Alerasool, “Systematic Characterization of Transcriptional Regulators by Site-Specific Protein Recruitment,” Department of Molecular Genetics, University of Toronto. (Advisor: Dr. Mikko Taipale).
- 2021 Thesis Committee Chair: Hannah L. Dotson, “Chemogenetic Control of Gene Expression and Protein Function with Small Molecules,” Department of Biomedical Engineering, Boston University. (Advisor: Dr. John T. Ngo).
- 2021 Thesis Advisor: Emma A. Briars, “Development of Methods to Diagnose and Predict Antibiotic Resistance Using Synthetic Biology and Computational Approaches,” Bioinformatics Program, Boston University.
- 2021 Thesis Committee Chair: Shannon Tunney, “Construction of Molecular Tools Through Protein Excision and Splicing,” Department of Biomedical Engineering, Boston University. (Advisor: Dr. John T. Ngo).
- 2021 Thesis Committee Chair: Brian J. Haas, “Bioinformatic Tool Developments with Applications to RNA-seq Data Analysis and Clinical Cancer Research,” Bioinformatics Program, Boston University. (Advisors: Drs. Aviv Regev and Simon Kasif).
- 2021 Thesis Committee Member: Mary Morrison, “Broadening the Scope of Phage-Assisted Continuous Evolution,” Department of Molecular and Cellular Biology, Harvard University. (Advisor: Dr. David R. Liu).
- 2021 Thesis Committee Member: Negin Zaraee, “Interferometric Imaging for Pathogenic Bacteria Identification and Antibiotic Susceptibility Testing,” Department of Electrical and Computer Engineering, Boston University. (Advisor: Dr. Selim Ünlü).
- 2020 Thesis Committee Member: Christine Nykyforchyn Goldfarb, “Sex-Biased and Xenobiotic-Responsive Long Non-Coding RNAs in Mouse Liver: Sub-Cellular Localization, Liver Cell-Type Specificity, and Knockdown by Epigenetic Reprogramming,” Department of Biomedical Engineering, Boston University. (Advisor: Dr. David J. Waxman).
- 2020 Thesis Committee Member: Alexander S. Garruss, “Accelerating the Understanding and Development of Intracellular Biosensors by Massively Multiplexed Experimentation and Machine Learning,” Biomedical Informatics, Division of Medical Sciences, Harvard University. (Advisor: Dr. George Church).

- 2020 Thesis Committee Member: Alan R. Pacheco, “Environmental Modulation of Microbial Ecosystems,” Bioinformatics Program, Boston University. (Advisor: Dr. Danel Segrè).
- 2020 Thesis Committee Chair: Ariel M. Langevin, “Dynamics and Evolution of Efflux Pump-Mediated Antibiotic Resistance,” Department of Biomedical Engineering, Boston University. (Advisor: Dr. Mary Dunlop).
- 2020 Thesis Committee Chair: Elliot Tague, “Engineering Novel Chemosensory Proteins to Respond to Antiviral Drugs,” Department of Biomedical Engineering, Boston University. (Advisor: Dr. John Ngo).
- 2020 Thesis Advisor: Divya V. Israni, “Advanced Gene Expression Control in Therapeutic Human Cells Using Synthetic Transcriptional Programs,” Department of Biomedical Engineering, Boston University.
- 2020 Thesis Committee Member: Bernardo Cervantes, “Tool Development for the Rapid Identification of Microbiome Manipulating Agents,” Microbiology Graduate Program, MIT. (Advisors: Drs. James J. Collins and Kristala Prather).
- 2020 Thesis Committee Member: Ross D. Jones, “Genetic Devices for Robust, Context-Independent Control of Gene Expression Levels in Mammalian Cells,” Department of Biological Engineering, MIT. (Advisors: Drs. Ron Weiss and Domitilla Del Vecchio).
- 2020 Thesis Committee Chair: David B. Bernstein, “Probabilistic Metabolic Modeling of Microbial Communities,” Department of Biomedical Engineering, Boston University. (Advisor: Dr. Daniel Segrè).
- 2020 Thesis Committee Member: Isaak E. Müller, “Engineering Probiotic Microbes for *In Vivo* Applications,” Microbiology Graduate Program, MIT. (Advisor: Dr. Timothy K. Lu).
- 2020 Thesis Committee Member: Rebecca T. Cottman, “Engineering CTCF DNA-Binding Specificity to Alter Gene Expression and Genome Topology in Human Cells,” Biological and Biomedical Sciences, Division of Medical Sciences, Harvard University. (Advisor: Dr. J. Keith Joung).
- 2020 External PhD Examiner: Gergana Shipkovenska, “Requirements for Epigenetic Inheritance of Heterochromatin in Fission Yeast,” Biological and Biomedical Sciences, Division of Medical Sciences, Harvard University. (Advisor: Dr. Danesh Moazed).
- 2020 Thesis Committee Member: Surojit Biswas, “Principles of Machine Learning-Guided Protein Engineering,” Bioinformatics and Integrative Genomics, Division of Medical Sciences, Harvard University. (Advisor: Dr. George Church).
- 2020 Thesis Advisor: Christopher P. Mancuso, “Environmental Fluctuations Modulate Microbial Competition, Diversity, and Persistence,” Department of Biomedical Engineering, Boston University.
- 2020 Thesis Committee Chair: Meghan Thommes, “Strategies for Engineering Microbial Communities,” Department of Biomedical Engineering, Boston University. (Advisor: Dr. Daniel Segrè).
- 2020 Thesis Committee Member: Wei-Hsi Yeh, “*In Vivo* Delivery and Therapeutic Applications of Base Editors,” Speech and Hearing Bioscience and Technology, Division of Medical Sciences, Harvard University. (Advisor: Dr. David Liu).
- 2020 Thesis Committee Chair: Tiebin Wang, “Fitness Costs in Antibiotic Resistance and Metabolic Engineering,” Molecular Biology, Cell Biology & Biochemistry Program, Boston University. (Advisor: Dr. Mary Dunlop).
- 2019 Thesis Committee Member: James Angstman, “Characterizing and Reducing Spurious DNA Edits by CRISPR Cytosine Base Editors,” Department of Molecular and Cellular Biology, Harvard University. (Advisor: Dr. J. Keith Joung).
- 2019 Thesis Committee Member: Puting Dong, “Single-Cell Pump Probe Imaging of Intrinsic Chromophores Identifies Diagnostic Marker and Therapeutic Target of Diseases,” Department of Chemistry, Boston University. (Advisor: Dr. Ji-Xin Cheng).

- 2019 Thesis Committee Member: Robert J. Seager, "Toward a Quantitative Understanding of Cancer Cell Signaling: Mathematical Models, Computational Tools, Applications, and Beyond," Department of Biomedical Engineering, Boston University. (Advisor: Dr. Muhammad Zaman).
- 2019 Thesis Committee Chair: Patricia Marie Aquino, "Genome-Wide Identification and Characterization of Transcription Factor-DNA Binding Interactions in Bacteria," Department of Biomedical Engineering, Boston University. (Advisor: Dr. James Galagan).
- 2019 Thesis Committee Member: Demetrius DiMucci, "Machine Learning Applications for Synthetic Microbial Ecology: Predicting Interactions and Identifying Their Putative Mechanisms," Bioinformatics Program, Boston University. (Advisor: Dr. Danel Segrè).
- 2019 Thesis Committee Chair: Jessica Keenan, "Characterizing Mechanisms of Regulatory Specificity in the Nuclear Receptors and General Transcriptional Cofactors," Bioinformatics Program, Boston University. (Advisor: Dr. Trevor Siggers).
- 2019 Thesis Advisor: Minhee Park, "Engineering a Synthetic Epigenetic System," Department of Biomedical Engineering, Boston University.
- 2019 Thesis Committee Member (MS): Charles Jo, "A Co-Culture Microplate Platform to Quantify Microbial Interactions and Growth Dynamics," Department of Biomedical Engineering, Boston University. (Advisor: Dr. Daniel Segrè).
- 2019 Thesis Co-Advisor (MS): Abdul Bhuiya, "Amplification-Free Detection of Transcriptional Biomarkers of Antibiotic Resistance Using Interferometric Reflectance Imaging Sensor (IRIS)," Department of Biomedical Engineering, Boston University.
- 2019 Thesis Committee Member: Pierce J. Ogden, "Dissecting Protein Fitness Landscapes Using DNA Synthesis and Sequencing: Case Studies in AAV and Beyond," Biological and Biomedical Sciences, Division of Medical Sciences, Harvard University. (Advisor: Dr. George Church).
- 2019 Thesis Co-Advisor: James Chuang, "Genomic Analyses of Transcription Elongation Factors and Intragenic Transcription," Department of Biomedical Engineering, Boston University. (Advisor: Dr. Fred Winston).
- 2019 Thesis Advisor (MS): Maria Simbirsky, "Continuous Culture of Bacteria Under Antibiotic Response," Department of Biomedical Engineering, Boston University.
- 2019 Thesis Committee Chair: James Needham, "Multiplexed Antibody Kinetics Using the Interferometric Reflectance Imaging Sensor," Department of Biomedical Engineering, Boston University. (Advisor: Dr. M. Selim Ünlü).
- 2019 Thesis Committee Member: Jang Hwan Cho, "Synthetic Biology Approaches to Improve Cell-Based Cancer Immunotherapy," Department of Biomedical Engineering, Boston University. (Advisors: Drs. Wilson Wong and James Collins).
- 2018 Thesis Committee Member: Nicholas Rossi, "Noise and Information in Bacterial Multigene Stress Response Systems," Molecular Biology, Cell Biology & Biochemistry Program, Boston University. (Advisor: Dr. Mary Dunlop).
- 2018 Thesis Committee Member: Demarcus Briers, "Mathematical Modeling and Pattern Design in Networks of Mammalian Cells," Bioinformatics Program, Boston University. (Advisor: Dr. Calin Belta).
- 2018 Thesis Committee Chair: Nitinun Bell Varongchayakul, "Protein Sensing Using Solid-State Nanopore," Department of Biomedical Engineering, Boston University. (Advisors: Dr. Mark Grinstaff, Dr. Amit Meller).
- 2018 Thesis Committee Member: Andrew M. Shumaker, "Discovery and Characterization of an Antimicrobial Toxin of the Gut Symbiont *Bacteroides fragilis*," Chemical Biology PhD Program, Harvard University. (Advisors: Dr. Pamela Silver, Dr. Laurie E. Comstock).
- 2018 Thesis Committee Member: Joshua E. Goldford, "Multi-Scale Metabolism: From the Origin of Life to Microbial Ecology," Bioinformatics Program, Boston University. (Advisor: Dr. Daniel Segrè).

- 2018 Thesis Advisor: Nikit Patel, "Engineering Biological Networks Using Cooperative Transcription Factor Assembly," Department of Biomedical Engineering, Boston University.
- 2018 Thesis Committee Member: Jason M. Gehrke, "Engineering High-Precision CRISPR-Cas9 Nuclease and Base Editor Technologies," Department of Molecular and Cellular Biology, Harvard University (Advisor: Dr. J. Keith Joung).
- 2018 Thesis Advisor: Brandon G. Wong, "Design, Development and Application of an Automated Framework for Cell Growth and Laboratory Evolution," Department of Biomedical Engineering, Boston University.
- 2018 Thesis Committee Member: Johnny H. Hu, "Directed Evolution of Cas9 for Mammalian Genome Editing," Biological and Biomedical Sciences, Division of Medical Sciences, Harvard University. (Advisor: Dr. David Liu).
- 2018 Thesis Committee Chair: Benjamin H. Weinberg, "Engineering Biocomputers in Mammalian Cells," Department of Biomedical Engineering, Boston University (Advisor: Dr. Wilson Wong).
- 2018 Thesis Advisor: Szilvia Kiriakov, "Synthetic Epigenetics in Yeast," Molecular Biology, Cell Biology & Biochemistry Program, Boston University.
- 2017 Thesis Committee Chair: Deboki Chakravarti, "Recombinase-Based Genetic Circuits in Human T Cells for Cellular Immunotherapy," Department of Biomedical Engineering, Boston University (Advisor: Dr. Wilson Wong).
- 2017 Thesis Co-Advisor: Ning Mao, "Exploiting the Benefits of Probiotics for Intestinal Disease Diagnosis and Therapy," Department of Biomedical Engineering, Boston University (Advisor: Dr. James Collins).
- 2017 Thesis Committee Member: Arion Stettner, "How Evolutionary Objectives and the Intracellular Environment Shape Metabolic Fluxes," Department of Biomedical Engineering, Boston University (Advisor: Dr. Daniel Segrè).
- 2017 Thesis Committee Member: Derin Sevenler, "Development of a Digital Microarray with Interferometric Reflectance Imaging," Department of Biomedical Engineering, Boston University (Advisor: Dr. M. Selim Ünlü).
- 2017 Thesis Advisor: Dana Braff, "Technological Advancements Towards Paper-Based Biomolecular Diagnostics," Department of Biomedical Engineering, Boston University.
- 2017 Thesis Advisor: Saloni Jain, "Quinolone Mechanism of Action: Sensitivity, Mutagenesis and Tolerance," Department of Biomedical Engineering, Boston University.
- 2017 Thesis Committee Member: Tyler E. Wagner, "Engineering a Regulatory Framework for Synthetic Self-Amplifying RNA Circuits," Department of Biomedical Engineering, Boston University. (Advisor: Dr. Ron Weiss).
- 2016 Thesis Committee Member: William Hesse, "Quantitative Analysis of Proteotoxicity Associated with Neurodegenerative Disease," Department of Biological Engineering, MIT. (Advisor: Dr. Susan Lindquist).
- 2016 Thesis Committee Chair: Swati Banerjee, "Reliable Gene Expression and Assembly for Synthetic Biological Devices in E. coli Through Customized Promoter Insulator Elements and Automated DNA Assembly," Molecular Biology, Cell Biology & Biochemistry Program, Boston University. (Advisor: Dr. Douglas Densmore).
- 2016 Thesis Advisor: Ali Beyzavi, "Investigation of the Heat Shock Response in Yeast: Quantitative Modeling and Single-Cell Microfluidic Studies," Department of Mechanical Engineering, Boston University.
- 2016 Thesis Committee Member: Deepak Mishra, "Principles for the Design and Construction of Synthetic Circuits Utilizing Protein-Protein Interactions in Saccharomyces cerevisiae," Department of Biological Engineering, MIT. (Advisor: Dr. Ron Weiss).

- 2015 Thesis Committee Member: Yu Sun, "Improving Recombineering Beyond Escherichia coli MG1655 Through the Broad Host-Range Expression of Metagenomic Libraries of Recombinases," Department of Biomedical Engineering, Boston University. (Advisor: Dr. George M. Church).
- 2015 Thesis Committee Member: Haiyao Huang, "Fluigi: An End-to-End Software Workflow for Microfluidic Design," Department of Electrical and Computer Engineering, Boston University. (Advisor: Dr. Douglas Densmore).
- 2015 Thesis Committee Chair: Christopher Jacobs, "Functional and Evolutionary Implications of In Silico Gene Deletion Studies," Bioinformatics Program, Boston University. (Advisor: Dr. Daniel Segrè).
- 2015 Thesis Committee Member: Sonia V. Iverson, "Improved Modular Multipart Assembly, Development of a DNA Part Toolkit for E. coli, and Applications in Traditional Biology and Bioelectronic Systems," Molecular Biology, Cell Biology & Biochemistry Program, Boston University. (Advisor: Dr. Douglas Densmore).
- 2015 Thesis Committee Member: Evan Appleton, "A Design-Build-Test-Learn Tool for Synthetic Biology," Bioinformatics Program, Boston University. (Advisor: Dr. Douglas Densmore).
- 2015 Thesis Committee Member: Yasha Sharma, "Collective Cell Motility in 3-Dimensions: Dynamics, Adhesions, and Emergence of Heterogeneity," Department of Biomedical Engineering, Boston University. (Advisor: Dr. Muhammad Zaman).
- 2015 Thesis Committee Chair: Elif Seymour, "Improvement of a Microarray-based Immunosensor for Rapid and Robust Detection of Viral Pathogens," Department of Biomedical Engineering, Boston University. (Advisor: Dr. M. Selim Ünlü).
- 2015 Thesis Committee Member: James E. DiCarlo, "Engineering Yeast Genomes and Populations," Department of Biomedical Engineering, Boston University. (Advisor: Dr. George M. Church).
- 2015 Thesis Committee Member: Michael T. Mee, "Controlling Microbial Community Dynamics Through Engineered Metabolic Dependencies," Department of Biomedical Engineering, Boston University. (Advisor: Dr. George M. Church).
- 2015 Thesis Committee Member: Russell-John Krom, "Bacteriophage Technologies and Their Application to Synthetic Gene Networks," MD/PhD Program, Boston University School of Medicine (Advisor: Dr. James J. Collins).
- 2015 Thesis Committee Member: Tyler J. Ford, "Engineering Escherichia coli Fatty Acid Metabolism for the Production of Biofuel Precursors," Biological and Biomedical Sciences, Division of Medical Sciences, Harvard University. (Advisor: Dr. Pamela A. Silver).
- 2014 Thesis Committee Member: Sandeep Choubey, "Biophysical Models of Transcription in Cells," Graduate Program in Physics, Brandeis University. (Advisor: Dr. Jané Kondev).
- 2014 Thesis Committee Member: Anna Lyubetskaya, "Transcription Factor Binding Distribution and Properties in Prokaryotes," Bioinformatics Program, Boston University. (Advisor: Dr. James Galagan).
- 2014 Thesis Committee Chair: Paul Iazzetti, "High-Throughput Binding Characterization of Bacterial Transcription Factors," Department of Biomedical Engineering, Boston University. (Advisor: Dr. James Galagan).
- 2014 Thesis Committee Chair: Suma Jaini, "Methods for Functional Characterization of Transcription Factor Binding Sites in Bacteria," Department of Biomedical Engineering, Boston University. (Advisor: Dr. James Galagan).
- 2014 Thesis Committee Chair: Jason P. Keller, "A Microfluidic Platform for Quantitative Analysis of Single Mycobacteria Cells," Department of Biomedical Engineering, Boston University. (Advisor: Dr. James Galagan).
- 2014 Thesis Committee Member: Mara C. Inniss, "Tracking Cell Fate with Synthetic Memory and Pulse Detecting Transcriptional Circuits," Biological and Biomedical Sciences, Division of Medical Sciences, Harvard University. (Advisor: Dr. Pamela A. Silver).

- 2014 Thesis Committee Member: Jun Li, "Towards Construction of Synthetic Ribosomes and a Self-Replicating System," Biological Sciences in Dental Medicine, Harvard University. (Advisor: Dr. George M. Church).
- 2013 Thesis Committee Member: Wen-Han Yu, "Quantitative Studies of Mycobacterial Single Cell Dynamics Using a Synthetic Gene Oscillator," Bioinformatics Program, Boston University. (Advisor: Dr. James Galagan).
- 2013 Thesis Committee Member: Irina Glotova, "Reconstruction of Lipid Metabolism Regulatory Network in Mycobacterium Tuberculosis," Bioinformatics Program, Boston University. (Advisor: Dr. James Galagan).
- 2013 Thesis Committee Member: Antonio Gomes, "Computational Approaches to Deciphering Regulatory Circuits in Mycobacterium tuberculosis From ChIP-Seq Data, and Developing Theoretical Strategies to Combat Drug-Resistant Infections," Bioinformatics Program, Boston University. (Advisor: Dr. James Galagan).
- 2012 Thesis Committee Chair: Sheetal Modi, "Systems Biology Approaches to Mechanisms of Bacterial Stress Adaptation," Department of Biomedical Engineering, Boston University. (Advisor: Dr. James J. Collins).
- 2012 Thesis Committee Member: Nicole M. Vega, "Induction of Antibiotic Tolerance in Bacteria by Self-Produced and Inter-Species Signaling," Molecular Biology, Cell Biology & Biochemistry Program, Boston University. (Advisor: Dr. James J. Collins).
- 2012 Thesis Committee Chair: Jonathan A. Winkler, "Improving Antibiotic Activity by Manipulating Bacterial Reactive Oxygen Species Metabolism," Molecular Biology, Cell Biology & Biochemistry Program, Boston University. (Advisor: Dr. James J. Collins).
- 2012 Thesis Committee Chair: Kyle R. Allison, "Engineering Solutions to Persistent Bacteria," Department of Biomedical Engineering, Boston University. (Advisor: Dr. James J. Collins).