

Curriculum Vitæ

Mark Goulian

Address

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Positions held

2017 – present	Charles and William L. Day Distinguished Professor in the Natural Sciences
2012 – 2016	Edmund J. and Louise W. Kahn Endowed Term Professor, Department of Biology and Department of Physics & Astronomy, University of Pennsylvania
2006 – 2012	Edmund J. and Louise W. Kahn Endowed Term Associate Professor, Department of Biology and Department of Physics & Astronomy, University of Pennsylvania
2000 – present	Member, Institute for Medicine and Engineering, University of Pennsylvania.
2000 – 2006	Assistant Professor, Department of Physics & Astronomy, University of Pennsylvania.
1999 – 2000	Research Associate, The Laboratory for Cellular Biophysics, The Rockefeller University.
1995 – 1999	W.M. Keck Fellow, The Center for Studies in Physics and Biology, The Rockefeller University.
1993 – 1995	Postdoctoral Fellow, Exxon Research and Engineering, Annandale, New Jersey.
1990 – 1993	Postdoctoral Fellow, Physics Department, University of California, Santa Barbara.

Education

1990	Ph.D., Physics, Harvard University, Thesis Advisor: Jonathan Bagger, Thesis: Conformal Field Theory on Higher Genus Riemann Surfaces.
1985	A.B., Physics, Harvard University.

Academic Honors

1985 – 88	National Science Foundation Graduate Fellowship.
1986	David J. Robbins Prize, awarded by Harvard Physics Department.
1985	Phi Beta Kappa, awarded by Harvard University.
1985	Magna Cum Laude with highest honors in physics, awarded by Harvard University.

Professional Activities

- Member, American Society for Microbiology
- APS Panel, Opportunities for Physicists in Biology, Boston, September 2002.
- XIII Nicolás Cabrera Institute Summer School: Biophysics of Biological Circuits: from Molecules to Networks, Madrid, September 2006.
- Member of the Advisory Board for the Kavli Institute for Theoretical Physics, University of California, Santa Barbara, 2007-2009.
- Participant, NIGMS Sponsored Workshop on Dynamics of Host-Associated Microbial Communities, November 2008.
- American Society for Microbiology Branch Lecturer, 2008-2010
- External Examiner, Angella Dorsey-Oresto thesis defense, Public Health Research Institute, UMDNJ, July, 2010.
- External Examiner, Lindsie Goss thesis defense, Dept. of Microbiology and Immunology, Columbia University, June, 2013.
- External Examiner, Orkan Telhan thesis defense, Dept. of Architecture, MIT, July, 2013.
- Ad Hoc Tenure Evaluation Committee, Harvard Medical School, Spring 2014.
- Reviewer, Simmons Investigators in MMLS, 2015, 2016
- External Thesis Committee Member for Elizabeth Upton, Drexel University College of Medicine, Department of Biochemistry, 2016 – present.
- External Thesis Committee Member for Lina Macunias, Drexel University College of Medicine, Department of Biochemistry, 2016 – present.
- EcoCyc Steering Committee, 2017-present

Summer School Lectures

- Boulder Summer School on Condensed Matter Physics (three lectures), July 2001.
- Lecturer, Advanced Bacterial Genetics Summer Course, Cold Spring Harbor Laboratory, June, 13, 2009.
- Rutgers University BIOMAPS Summer School (one lecture), June 2005.

Conferences/Workshops Organized

- Co-organizer, Bacterial Regulation Workshop, KITP, Santa Barbara, January 2003.
- Co-organizer, Colloquium on Prokaryotic Regulatory Networks, General Meeting of the American Society for Microbiology, Atlanta, May 2005.
- Co-organizer, Symposium on Networks in Bacteria and Yeast, Joint Meeting of the International Union of Microbiological Societies, San Francisco, July 2005.
- Organizer, Colloquium on Systems Microbiology, General Meeting of the American Society for Microbiology, Philadelphia, May 2009.
- Co-Chair, Microbial Stress Response Gordon Conference, July, 2010.
- Co-Organizer, Molecular Genetics of Bacteria and Phages, 2011-2014

Reviewing

- NSF Nanoscale Science and Technology Review Panel, February 2001
- NSF Prokaryotic Molecular and Cellular Biology Review Panel, 2002-2008
- Review Panel, Oklahoma Center for the Advancement of Science and Technology, Spring, 2011
- Ad hoc reviewer, NSF MCB, 2003-present.
- Ad hoc reviewer, NIH MABS study section, June 2007, Sept. 2011.
- Ad hoc reviewer, NIH EUREKA initiative, Spring, 2011
- NIH F13 Infectious Diseases and Microbiology Fellowship Review Panel, Spring, 2013

- DOE Biosystems Review Panel, Spring, 2017
- Ad hoc editor, PLoS Computational Biology, PNAS
- Ad hoc reviewer for numerous journals, including: Biochemical Journal, Genetics, Journal of Bacteriology, Journal of Molecular Biology, mBio, Molecular Cell, Molecular Microbiology, Molecular Systems Biology, Nature, Nature Communications, Physical Review E, Physical Review Letters, PLoS Computational Biology, PLoS Genetics, PLoS Pathogens, Proceedings of the National Academy of Sciences, Science, Scientific Reports.

Peer-Reviewed Publications

1. Carey, J.N., E.L. Mettert, M. Roggiani, K.S. Myers, P.J. Kiley, **M. Goulian**. Regulated stochasticity in a bacterial signaling network permits tolerance to a rapid environmental change. (2018) *Cell*, in press.
2. Roggiani, M., S. S. Yadavalli, **M. Goulian**. (2017). Natural variation of a sensor kinase controlling a conserved stress response pathway in Escherichia coli. *PLoS Genet*, 13(11), e1007101.
3. Jishkariani, D., C. M. MacDermaid, Y. N. Timsina, S. Grama, S. S. Gillani, M. Divar, S. S. Yadavalli, R. O. Moussodia, P. Leowanawat, A. M. Berrios Camacho, R. Walter, **M. Goulian**, M. L. Klein and V. Percec. 2017. Self-interrupted synthesis of sterically hindered aliphatic polyamide dendrimers. *Proc Natl Acad Sci U S A* 114: E2275-E2284.
4. Kubiak, J. M., M. J. Culyba, M. Y. Liu, C. Y. Mo, **M. Goulian**, R. M. Kohli. (2017). A Small-Molecule Inducible Synthetic Circuit for Control of the SOS Gene Network without DNA Damage. *ACS Synth Biol*, 6(11), 2067-2076.
5. Ni, J., T. D. Shen, E. Z. Chen, K. Bittinger, A. Bailey, M. Roggiani, A. Sirota-Madi, E. S. Friedman, L. Chau, A. Lin, I. Nissim, J. Scott, A. Lauder, C. Hoffmann, G. Rivas, L. Albenberg, R. N. Baldassano, J. Braun, R. J. Xavier, C. B. Clish, M. Yudkoff, H. Li, **M. Goulian**, F. D. Bushman, J. D. Lewis, G. D. Wu. (2017). A role for bacterial urease in gut dysbiosis and Crohn's disease. *Sci Transl Med*, 9(416).
6. Niepa, T. H. R., L. Vaccari, R. L. Leheny, **M. Goulian**, D. Lee, K. J. Stebe. (2017). Films of Bacteria at Interfaces (FBI): Remodeling of Fluid Interfaces by Pseudomonas aeruginosa. *Sci Rep*, 7(1), 17864.
7. Yadavalli, S.S., J. N. Carey, R. S. Leibman, A. I. Chen, A. M. Stern, M. Roggiani, A. M. Lippa, **M. Goulian**. 2016. Antimicrobial Peptides trigger a division block in *E. coli* through stimulation of a signaling pathway. *Nat Commun* 7:12340.
8. Niepa, T. H., L. Hou, H. Jiang, **M. Goulian**, H. Koo, K. J. Stebe, D. Lee. 2016. Microbial Nanoculture as an Artificial Microniche. *Sci Rep*, 6, 30578.
9. Mo, C. Y., S. A. Manning, M. Roggiani, M. J. Culyba, A. N. Samuels, P. D. Sniegowski, **M. Goulian**, R. M. Kohli. 2016. Systematically Altering Bacterial SOS Activity under Stress Reveals Therapeutic Strategies for Potentiating Antibiotics. *mSphere*, 1(4).
10. Xiao, Q., J. D. Rubien, Z. Wang, E. H. Reed, D. A. Hammer, D. Sahoo, P. A. Heiney, S. S. Yadavalli, **M. Goulian**, S. E. Wilner, T. Baumgart, S. A. Vinogradov, M. L. Klein, V. Percec. 2016. Self-Sorting and Coassembly of Fluorinated, Hydrogenated, and Hybrid Janus Dendrimers into Dendrimersomes. *J Am Chem Soc*, 138(38), 12655-12663.
11. Xiao, Q., S. S. Yadavalli, S. Zhang, S. E. Sherman, E. Fiorin, L. da Silva, D. A. Wilson, D. A. Hammer, S. Andre, H. J. Gabius, M. L. Klein, **M. Goulian**, V. Percec. 2016.

- Bioactive cell-like hybrids coassembled from (glyco)dendrimerosomes with bacterial membranes. *Proc Natl Acad Sci U S A*, 113(9), E1134-1141.
12. Liu, Z., H. Wang, Z. Zhou, N. Naseer, F. Xiang, B. Kan, **M. Goulian** and J. Zhu. 2016. Differential Thiol-Based Switches Jump-Start *Vibrio cholerae* Pathogenesis. *Cell Rep*. 14: 347-354.
 13. Xiao, Q., S. S. Yadavalli, S. Zhang, S. E. Sherman, E. Fiorin, L. da Silva, D. A. Wilson, D. A. Hammer, S. Andre, H. J. Gabius, M. L. Klein, **M. Goulian** and V. Percec. 2016. Bioactive cell-like hybrids coassembled from (glyco)dendrimerosomes with bacterial membranes. *Proc Natl Acad Sci U S A*. 113:E1134-1141.
 14. Oppong, G. O., G. J. Rapsinski, S. A. Tursi, S. G. Biesecker, A. J. Klein-Szanto, **M. Goulian**, C. McCauley, C. Healy, R. P. Wilson and C. Tukul. 2015. Biofilm-associated bacterial amyloids dampen inflammation in the gut: oral treatment with curli fibres reduces the severity of hapten-induced colitis in mice. *NPJ Biofilms Microbiomes*. 1: 1-8.
 15. Gallo, P. M., G. J. Rapsinski, R. P. Wilson, G. O. Oppong, U. Sriram, **M. Goulian**, B. Buttaro, R. Caricchio, S. Gallucci and C. Tukul. 2015. Amyloid-DNA Composites of Bacterial Biofilms Stimulate Autoimmunity. *Immunity*. 42: 1171-1184.
 16. Patteson, A. E., A. Gopinath, **M. Goulian** and P. E. Arratia. 2015. "Running and tumbling with *E. coli* in polymeric solutions." *Sci Rep* 5: 15761.
 17. Bhate, M.P., K.S. Molnar, **M. Goulian**, W. DeGrado. 2015. Signal Transduction in Histidine Kinases: Insights from New Structures. *Structure*. 23:981-994.
 18. Roggiani, M. and **M. Goulian**. 2015. Oxygen-Dependent Cell-to-Cell Variability in the Output of the *E. coli* Tor Phosphorelay. *J Bacteriol*. 197:1976-1987.
 19. Hann, S.D., **M. Goulian**, D. Lee, K.J. Stebe. 2015. Trapping and assembly of living colloids at water-water interfaces. *Soft Matter*. 11:1733-1738.
 20. Bai, Y, Y. Wang, **M. Goulian**, A. Driks, I.J. Dmochowski. 2014. Bacterial spore detection and analysis using hyperpolarized ¹²⁹Xe chemical exchange saturation transfer (Hyper-CEST) NMR. *Chem Sci*. 5:3197-3203.
 21. Molnar K.S., M. Bonomi, R. Pellarin, G.D. Clinthorne, G. Gonzalez, S.D. Goldberg, **M. Goulian**, A. Sali, W.F. DeGrado. 2014. Cys-Scanning Disulfide Crosslinking and Bayesian Modeling Probe the Transmembrane Signaling Mechanism of the Histidine Kinase, PhoQ. *Structure*. 22:1239-1251.
 22. Magaraci, M.S., A. Veerakumar, P. Qiao, A. Amurthur, J.Y. Lee, J.S. Miller, **M. Goulian**, and C.A. Sarkar. 2014. Engineering *Escherichia coli* for light-activated cytolysis of mammalian cells. *ACS Synthetic Biology*.
 23. Lasaro, M, Z. Liu, R. Bishar, K. Kelly, S. Chattopadhyay, S. Paul, E. Sokurenko, J. Zhu, **M. Goulian**. 2014. *Escherichia coli* Isolate for Studying Colonization of the Mouse Intestine and Its Application to Two-Component Signaling Knockouts. *J. Bacteriol*. 196:1723-1732.
 24. Ram, S. and **M. Goulian**. 2013. The Architecture of a Prototypical Bacterial Signaling Circuit Enables a Single Point Mutation to Confer Novel Network Properties. *PLoS Genet*. 9(8)e1003706.
 25. Chow, D., L. Guo, F. Gai, and **M. Goulian**. 2012. Fluorescence Correlation Spectroscopy Measurements of the Membrane Protein TetA in *Escherichia coli* Suggest Rapid Diffusion at Short Length Scales. *PLoS One*. 7:e48600
 26. Bashi, S. and A. Siryaporn, **M. Goulian**, and J.C. Weisshaar. 2012. Superresolution Imaging of Ribosomes and RNA Polymerase in Live *Escherichia coli* Cells. *Mol. Microbiol*. 85:21-38.
 27. Libby, E.A. and **M. Goulian**. 2012. Membrane Protein Expression Triggers Chromosomal Locus Repositioning in Bacteria. *Proc. Natl. Acad. Sci*. 109:7445-7450.

28. Lippa, A.M. and **M. Goulian**. 2012. Perturbing the Oxidizing Environment of the Periplasm Stimulates the PhoQ/PhoP System in *E. coli*. *J. Bacteriol.* 194:1457.
29. Siryaporn, A., B.S. Perchuk, M.T. Laub, and **M. Goulian**. 2010. Evolving a Robust Signal Transduction Pathway from Weak Cross-Talk. *Mol. Sys. Biol.* 6(452):1-7.
30. Libby, E.A., S. Ekici, and **M. Goulian**. 2010. Imaging OmpR Binding to Native Chromosomal Loci in *Escherichia coli*. *J. Bacteriol.* 192:4045-4053.
31. Goldberg S.D., G.D. Clinthorne, **M. Goulian**, and W.F. Degrado. 2010. Transmembrane Polar Interactions are Required for Signaling in the *Escherichia coli* Sensor Kinase PhoQ. *Proc. Natl. Acad. Sci.* 107:8141-8146.
32. Lippa, A.M. and **M. Goulian**. 2009. Feedback Inhibition in the PhoQ/PhoP Signaling System by a Membrane Peptide. *PLoS Genet.* 5(12):1-9.
33. Goldberg, S.D., P. Derr, W.F. DeGrado, and **M. Goulian**. 2009. Engineered Single- and Multi-Cell Chemotaxis Pathways in *E. coli*. *Mol. Syst. Biol.* 5(283):1-6.
34. Lasaro, M.A., N. Salinger, J. Zhang, Y. Wang, Z. Zhong, **M. Goulian**, and J. Zhu. 2009. F1C Fimbriae Play an Important Role in Biofilm Formation and Intestinal Colonization by the *Escherichia coli* Commensal Strain Nissle 1917. *Appl. Environ. Microbiol.* 75:246-251.
35. Siryaporn A, and **M. Goulian**. 2008. Cross-Talk Suppression Between the CpxA-CpxR and EnvZ-OmpR Two-Component Systems in *E. coli*. *Mol Microbiol.* 70:494-506.
36. Miyashiro T, and **M. Goulian**. 2008. High Stimulus Unmasks Positive Feedback in an Autoregulated Bacterial Signaling Circuit. *Proc Natl Acad Sci* 105:17457-17462.
37. Liu, Z., T. Miyashiro, A. Tsou, A. Hsiao, **M. Goulian**, J. Zhu. 2008. Mucosal Penetration Primes *Vibrio cholerae* for Host Colonization by Repressing Quorum Sensing. *Proc. Nat. Acad. Sci.* 105:9769-9774.
38. Skerker, J.M., B.S. Perchuk, A. Siryaporn, E.A. Lubin, O. Ashenberg, **M. Goulian**, and M. Laub. 2008. Rewiring the Specificity of Two-Component Signal Transduction Systems. *Cell* 133:1043-1054.
39. Miyashiro, T., and **M. Goulian**. 2007. Stimulus-Dependent Differential Regulation in the *Escherichia coli* PhoQ-PhoP system. *Proc. Nat. Acad. Sci.* 104:16305-16310.
40. Chen, D.T., A.W. Lau, L.A. Hough, M.F. Islam, **M. Goulian**, T.C. Lubensky, A.G. Yodh. 2007. Fluctuations and Rheology in Active Bacterial Suspensions. *Phys. Rev. Lett.* 99:148302-148305.
41. Lee, J.H, **M. Goulian**, and E.T. Boder. 2006. Autocatalytic Activation of Influenza Hemagglutinin. *J. Mol. Biol.* 364:275-282.
42. **Goulian, M.** and M. van der Woude. 2006. A Simple System for Converting *lacZ* to *gfp* Reporter Fusions in Diverse Bacteria. *Gene* 372:219-226.
43. Batchelor, E. and **M. Goulian**. 2006. Imaging OmpR Localization in *E. coli*. *Mol. Micro.* 59:1767-1778.
44. Derr, P., E. Boder, and **M. Goulian**. 2006. Changing the Specificity of a Bacterial Chemoreceptor. *J. Mol. Biol.* 355:923-932.
45. Vijayan, K. D. Discher, J. Lal, P. Janmey and **M. Goulian**. Interactions of Membrane-Active Peptides with Thick, Neutral, Non-Zwitterionic Bilayers. 2005. *J. Phys. Chem B.* 109:14356-14364.
46. Batchelor, E., D. Walthers, L.J. Kenney and **M. Goulian**. 2005. The *Escherichia coli* CpxA-CpxR Envelope Stress Response System Regulates Expression of the Porins OmpF and OmpC. *J. Bacteriol.* 187:5723-5731.
47. Batchelor, E., T.J. Silhavy and **M. Goulian**. 2004. Continuous Control in Bacterial Regulatory Circuits. *J. Bacteriol.* 186:7618-7635.

48. Batchelor, E. and **M. Goulian**. 2003. Robustness and the Cycle of Phosphorylation and Dephosphorylation in a Two-Component Regulatory System. *Proc. Nat. Acad. Sci.* 100:691-696.
49. **Goulian, M.** and S.M. Simon, Tracking Single Proteins within Cells. 2000. *Biophys. J.* 79:2188-2198.
50. Kahl, B.C., **M. Goulian**, W. Van Wamel, M. Hermann, S.M. Simon, G. Kaplan, G. Peters, and A.L. Cheung. 2000. *Staphylococcus aureus* RN6390 Replicates and Induces Apoptosis in a Pulmonary Epithelial Cell Line. *Infect. Immun.* 68:5385-5392.
51. Schmoranzler, J., **M. Goulian**, D. Axelrod, S.M. Simon. 2000. Imaging Constitutive Exocytosis with Total Internal Reflection Fluorescence Microscopy. *J. Cell Biol.* 149:23-31.
52. Nielsen, C., **M. Goulian**, O.S. Andersen. 1998. Energetics of Inclusion-Induced Bilayer Deformations. *Biophys. J.* 74:1966-1983.
53. **Goulian, M.**, O.N. Mesquita, D.K. Fygenson, C. Nielsen, O.S. Andersen, and A. Libchaber. 1998. Gramicidin Channel Kinetics Under Tension. *Biophys. J.* 74:328-337.
54. Golestanian, R., **M. Goulian**, and M. Kardar. 1996. Fluctuation-Induced Interactions between Rods on a Membrane. *Phys Rev. E* 54:6725-6734.
55. **Goulian, M.** and S.T. Milner. 1996. Shape Fluctuations of a Droplet Containing a Polymer. *J. de Phys. II* 6:543-550.
56. Golestanian, R., **M. Goulian**, and M. Kardar. 1996. Fluctuation-Induced Interactions between Rods on Membranes and Interfaces. *Europhys. Lett.* 33:241-245.
57. **Goulian, M.** and S.T. Milner. 1995. Shear Alignment and Instability of Smectic Phases. *Phys. Rev. Lett.* 74:1775-1778.
58. Bruinsma, R., **M. Goulian**, and P. Pincus. 1994. Self-Assembly of Membrane Junctions. *Biophys. J.* 67:746-750.
59. Singh, C., **M. Goulian**, A.J. Liu, and G.H. Fredrickson. 1994. Phase Behavior of Semiflexible Diblock Copolymers. *Macromolecules* 27:2974-2986.
60. **Goulian, M.**, R. Bruinsma, and P. Pincus. 1993. Long-Range Forces In Heterogenous Fluid Membranes *Europhys. Lett.* 22:145-150.
61. **Goulian, M.**, N. Lei, J. Miller, and S. Sinha. 1992. Structure Factor for Randomly Oriented Self-Affine Membranes. *Phys. Rev. A* 46:R6170-R6173.
62. Abraham, F.F. and **M. Goulian**. 1992. Diffraction from Polymerized Membranes: Flat Versus Crumpled. *Europhys. Lett.* 19:293-296.
63. **Goulian, M.** 1991. The Gaussian Approximation for Self-Avoiding Tethered Surfaces. *J. de Phys. II France* 1:1327-1330.
64. **Goulian, M.** 1991. The Ising Model on a Fluctuating Disk. *Phys. Lett.* 264B:292-296.
65. **Goulian, M.** and M. Li. 1991. Correlation Functions in Liouville Theory. *Phys. Rev. Lett.* 66:2051-2055.
66. Ginsparg, P., **M. Goulian**, M.R. Plesser, and J. Zinn-Justin. 1990. (p,q) String Actions. *Nucl. Phys.* B342:539-563.
67. Bagger, J. and **M. Goulian**. 1990. Coulomb-Gas Representation on Higher-Genus Surfaces. *Nucl. Phys.* B330:488-508.
68. **Goulian, M.D.** and O.F. Hernandez. 1988. Constraints on Representations of Conformal Field Theories. *Phys. Lett.* 215B:511-516.

Invited Commentaries, Reviews, Book Chapters

1. Roggiani, M. and **M. Goulian**. 2015. Chromosome-Membrane Interactions in Bacteria. *Annu Rev Genet.* 49: 115-129.

1. **Goulian M.** 2010. Two-Component Signaling Circuit Structure and Properties. *Curr Opin Microbiol.* 13:184-189.
2. Siryaporn, M. and M. Goulian. 2010. Characterizing Cross-Talk In Vivo: Avoiding Pitfalls and Overinterpretation. *Methods in Enzymology.* 471C:1-16.
3. Laub, M.T. and **M. Goulian.** 2007. Specificity in Two-Component Signaling. *Ann. Rev. Genet.* 41:121-145.
4. Miyashiro, T. and **M. Goulian.** 2007. Single-Cell Analysis of Gene Expression by Fluorescence Microscopy. *Methods in Enzymology.* 423:458-475.
5. **Goulian, M.** Robust Control in Bacterial Regulatory Circuits. 2004. *Curr. Opin. Microbiol.* 7:198-202.
6. Andersen, O.S., C. Nielsen, A.M. Maer, J.A. Lundbæk, **M. Goulian,** and R.E. Koeppe II. 1998. Gramicidin Channels: Molecular Force Transducer in Lipid Bilayers. *Biol. Skr. Dan. Vid. Selsk.* 49:75-82.
7. Andersen, O.S., C. Nielsen, A.M. Maer, J.A. Lundbæk, **M. Goulian,** and R.E. Koeppe II. 1999. Ion Channels as Tools to Monitor Lipid Bilayer-Membrane Protein Interactions: Gramicidin Channels as Molecular Force Transducers. *Methods in Enzymology.* 294:208-224.
8. **Goulian, M.** and A. Libchaber. 1996. A New Technique for Probing Inter-Membrane Interactions. *J. Gen Physiol.* 107:311-312.
9. **Goulian, M.** 1996. Inclusions in Membranes. *Curr. Op. Coll. Int. Sci.* 1:358-361.*
10. Bagger, J. and **M. Goulian.** 1990. Coulomb-Gas Construction on Higher-Genus Riemann Surfaces. in *Differential Geometric Methods in Theoretical Physics*, eds. L.-L. Chau and W. Nahm, Plenum, New York, 189-201.

Classes Taught at the University of Pennsylvania (percentage denotes portion of course)

- Fall 2000 PHYS 101 – General Physics: Mechanics, Heat and Sound.
100% of one section, 42 students
- Fall 2001 PHYS 531 – Quantum Mechanics I, 100%, 15 students
- Spring 2002 PHYS 532 – Quantum Mechanics II, 100%, 10 students
- Fall 2002 PHYS 531 – Quantum Mechanics I, 100%, 23 students
- Spring 2003 PHYS 532 – Quantum Mechanics II, 100%, 23 students
- Fall 2003 PHYS 531 – Quantum Mechanics I, 100%, 11 students
- Spring 2004 PHYS 532 – Quantum Mechanics II, 100%, 9 students
- Fall 2004 PHYS 280/580 – Biological Physics, 100%, 35 students
- Fall 2005 PHYS 500 – Mathematical Methods of Physics, 100%, 34 students
- Spring 2006 PHYS 580 – Biological Physics, 100%, 11 students
- Fall 2006 PHYS 500 – Mathematical Methods of Physics, 100%, 11 students
- Spring 2007 PHYS 580 – Biological Physics, 100%, 13 students
- Fall 2007 BIOL 275– Microbiology, 33%, 39 students
- Spring 2008 BIOL 121 – Introduction to Biology – The Molecular Biology of
Life, 50%, 51 students.
- Fall 2008 PHYS 580 – Biological Physics, 100%, 18 students
- Spring 2009 BIOL 121– Introduction to Biology – The Molecular Biology of Life,
50%, 72 students
- Fall 2009 BIOL 121– Introduction to Biology – The Molecular Biology of Life,
25%, 271 students

- BIOL 526 – Experimental Principles in Cell and Molecular Biology, 100%, 39 students
- Spring 2010 BIOL 121– Introduction to Biology – The Molecular Biology of Life 25%, 76 students
- Fall 2010 BIOL 121– Introduction to Biology – The Molecular Biology of Life, 25%, 224 students
PHYS 580 – Biological Physics, 100%, 23 students
- Spring 2011 BIOL 121– Introduction to Biology – The Molecular Biology of Life 25%, 56 students
- Fall 2011 BIOL 121– Introduction to Biology – The Molecular Biology of Life 25%, 221 students
- Spring 2012 BIOL 121 – Introduction to Biology – The Molecular Biology of Life 25%, 221 students
- Fall 2012 BIOL 121– Introduction to Biology – The Molecular Biology of Life 25%, 222 students
- Fall 2012 PHYS 580 – Biological Physics, 100%, 28 students
- Spring 2013 BIOL 121 – Introduction to Biology – The Molecular Biology of Life 25%, 66 students
- Fall 2013 BIOL 121– Introduction to Biology – The Molecular Biology of Life 25%, 173 students
- Fall 2012 BIOL 700 – Advanced Topics in Current Biology Research, 100%, 7 students
- Spring 2014 BIOL 121 – Introduction to Biology – The Molecular Biology of Life 25%, 44 students
- Fall 2014 BIOL 121 – Introduction to Biology – The Molecular Biology of Life 25%, 180 students
- Spring 2015 BIOL 121 – Introduction to Biology – The Molecular Biology of Life 25%, 60 students
- Fall 2015 BIOL 121 – Introduction to Biology – The Molecular Biology of Life 25%, 230 students
- Spring 2016 BIOL 535 –Topics in the Theory of Living Systems
3 students
- Fall 2016 BIOL 121 – Introduction to Biology – The Molecular Biology of Life 50%, 216 students
PHYS 500 – Mathematical Methods of Physics, 100%, 31 students

Additional Penn Course Lectures/Tutorials

- Fall 2002 CAMB 539 – Prokaryotic Molecular Genetics (two 1.5 hr lectures)
- Spring 2003 BMB 598 – Tutorial with Daryl Klein
- Fall 2003 CAMB 539 – Prokaryotic Molecular Genetics (two 1.5 hr lectures)
- Fall 2004 CAMB 539 – Prokaryotic Molecular Genetics (two 1.5 hr lectures)
BIOL 475 – Microbiology and Biotechnology (one 1.5 hr lecture)
- Fall 2005 BIOL 475 – Microbiology and Biotechnology (one 1.5 hr lecture)
- Fall 2006 BMB 598 – Tutorial with Chaim Schramm
- Spring 2006 PHYS 295 – Intro. to Research in Physics (two 1.5 hr lectures)
CAMB 548 – Bacterial Pathogenesis (three 1 hr lectures)

- Spring 2007 BIOM 555 – Control of Gene Expression (two 1.5 hr lectures)
- Spring 2008 BIOM 555 – Control of Gene Expression (two 1.5 hr lectures)
BIOL 482 – Comm. at Cellular Level (one 1.5 hr lecture)
BMB 598 – Tutorial with Edward Ballister
- Summer 2008 BMB 598 – Tutorial with Nicholas Bessman
- Fall 2008 BIOL 475 – Microbiology and Biotechnology (one 1.5 hr lecture)
- Spring 2009 BIOM 555– Control of Gene Expression (two 1.5 hr lectures)
- Spring 2010 BIOM 555– Control of Gene Expression (two 1.5 hr lectures)
BMB 509– Macromolecular Biophysics (two 1.5 hr lectures)
- Fall 2010 BIOL475– Microbiology and Biotechnology (one 1.5 hr lecture)
- Spring 2011 BIOM 555– Control of Gene Expression (two 1.5 hr lectures)
BMB 509– Macromolecular Biophysics (two 1.5 hr lectures)
- Spring 2012 BIOM 555– Control of Gene Expression (two 1.5 hr lectures)
BMB 509– Macromolecular Biophysics (two 1.5 hr lectures)
BIOL 499 (6 weekly 1 hr meetings with students)
- Spring 2013 BIOM 555 – Control of Gene Expression (two 1.5 hr lectures + exam questions)
BMB 509 – Structural and Mechanistic Biochemistry (one 1.5 hr lecture + exam questions)
BIOL 526 – Experimental Principles in Cell and Molecular Biology (two 3 hour classes)
CAMB 698 – Elective Tutorial in Cell and Molecular Biology (Tutorial with Amanda Hey, a graduate student from MVP)
- Fall 2013 CAMB 548 – Bacterial Pathogenesis (two 1 hr lectures+exam questions)
BIOL 999 – reading course on molecular biology and synthetic biology with Elizabeth Beattie, graduate student in Mechanical Engineering.
- Spring 2014 BIOM 555 – Control of Gene Expression (two 1.5 hr lectures + exam questions)
BMB 509 – Structural and Mechanistic Biochemistry (one 1.5 hr lecture + one 1.5 hr student-led discussion + exam questions)
BIOL 425 – project contributor + 1 hr lecture
- Fall 2014 CAMB 548 – Bacterial Pathogenesis (three 1 hr lectures+exam questions)
- Spring 2015 BIOM 555 – Control of Gene Expression (two 1.5 hr lectures + exam questions)
- Spring 2015 BMB 509 – Structural and Mechanistic Biochemistry (one 1.5 hr lecture)
- Spring 2015 CAMB 700 (one 1.5 hour prelim preparation class)
- Fall 2015 CAMB 548 – Bacterial Pathogenesis (three 1 hr lectures+exam questions)
- Spring 2016 BIOM 555 – Control of Gene Expression (two 1.5 hr lectures)
BMB 509 – Structural and Mechanistic Biochemistry (one 1.5 hr lecture + one 1.5 hr student-led discussion + exam questions)
- Fall 2016 CAMB 706 – MVP Core (three 1 hr lectures+exam questions)
- Spring 2017 BIOM 555 – Control of Gene Expression (two 1.5 hr lectures)
BMB 509 – Structural and Mechanistic Biochemistry (one 1.5 hr lectures)

Outreach Activities

- Lecturer, LRSM outreach program for high school science teachers, 2001, 2003, 2004, 2006
- Lecturer, Penn Summer Science Academy for High School Students, Summer 2007, 2008
- Lecturer, LRSM REU Summer Program, 2009, 2011.
- Capstone Content Reader, masters of Integrated Science Education Program, Summer 2010.
- Lecturer, Penn Professional Development Program for high school biology teachers, 2014.
- Host for Spark program student, 2014, 2016, 2017
- Host for Philadelphia high school science teacher research experience program (through the LRSM outreach program)

Department/University Service

- Physics Dept. Graduate Admissions Committee, 2000-2003, 2005-2006
- Physics Dept. Condensed Matter Search Committee, 2000-2003
- Physics 151 Lab Committee, 2003-2004
- Physics Undergraduate Lab Committee, 2005-2006
- Physics Library Committee, 2004-2005
- Physics Dept. Web Page Committee, 2006-2007
- Biology Dept. Graduate Admissions Committee, 2006-2010
- Biology Dept. Genomics Search Committee, 2006-2008
- Physics Dept. Biophysics Search Committee, 2006-2007
- Biology Dept. PIK Committee, 2006-2007
- Biology Dept. Retreat Organizer 2007-present
- Pharmacology Graduate Group Review Committee, 2007-2008
- Cell and Molecular Biology MVP Graduate Group Executive Committee, 2007-2011
- Biology Curriculum/Exam Committee, 2008
- BIOL700 New Format Committee, 2008
- SAS NSF Outreach Committee, 2008-2009
- University Research Foundation Natural Sciences and Engineering Committee, Fall 2009
- Integrated Graduate Training Committee (Biology), 2010-2011
- Physics Dept. Bio/Nano Search, 2010-2012
- SAS Curriculum Committee, 2010-2012
- HHMI Graduate Fellowship Committee, 2011
- SAS Energy Cluster Hire committee 2011-2012
- Co-advisor, UPenn iGEM team, 2012.
- Biology Department Qualifying Exam Committee, 2011-2012
- Penn Integrating Knowledge Working Group Self-Study for the MSCHE reaccreditation 2012- 2013
- Microbiology Seminar Committee (CAMB-MVP), 2011-2013.
- Biology Dept. Web Page Committee 2012-2013

- Biology Graduate Group Finance Committee, 2012-2013
- Biology Dept. Chairman Selection Committee, 2012-2013
- Promotion Committee for Mecky Pohlschroder, 2012-2013
- Ad hoc committee to evaluate the dossier of Joseph St. Geme for appointment as Professor in the department of Pediatrics. 2013.
- GCB Graduate Group Advising Committee, 2010-present. (Chair, 2013-2015)
- SAS Planning and Priorities Committee, 2012-2015
- Biology Dept. Graduate Student Advising and Assessment Committee. 2013-2015
- SAS Personnel Committee, 2013-2014 (Chair 2014-2015)
- Biology Dept. Ad hoc committee to review departmental promotion process, 2014.
- Joint Biology/Physics undergraduate training discussion group, 2014-2015
- Biology Dept. Faculty Development (Vision) Committee. 2013-2017
- Biology Dept. PIK committee, 2014-present
- Scientific Advisory Board for the Penn-CHOP Microbiome Program, 2014-present.
- Energy Cluster Search Committee, 2015-present
- Panelist, Navigating the Promotion Process at Penn, Penn Faculty Pathways Program, 2016.
- Adhoc reviewer, Penn URF Biomedical Panel, 2016
- Adhoc promotion committee for Alison Sweeney, Physics, 2017
- Biology Dept. Graduate Student Advising and Assessment Committee. 2016-present
- Biochemistry and Molecular Biophysics Faculty Search Committee, 2017-
- SAS Committee on Committees – 2017-

Current Grant Support

R21AI125814 (Goulian) 6/15/2016-6/14/2018
 NIH/NIAID
***E. coli* niche expansion and adaptation in the dysbiotic intestine**
 Role: PI

R01GM080279 (Goulian) 01/01/017-12/31/20

 NIH/NIGMS
Oxygen-dependent bacterial signaling
 Role: PI

Previous Grant Support

DMR11-20901 (Yodh) 9/15/11-08/31/17
 NSF/DMR

Materials Research Science and Engineering Center (MRSEC) IRG-2: Biologically Inspired Janus Dendrimer Assemblies.

Role: Co-Investigator

2R01GM080279-05A1 (Goulian) 08/01/012-12/31/17

NIH/NIGMS

Regulation of Bacterial Two-Component Signaling by Small Membrane Proteins

Role: PI

2R01AI074866 (DeGrado) 8/1/2013-7/31/2014

NIH/NIAID

Design and Mechanistic Studies of Mimics of Antimicrobial Peptides

Role: Co-PI

R01 GM080279 (Goulian) 06/01/07-05/31/13

NIH/NIGMS

Modeling and Analysis of Bacterial Signaling Circuits

Role: PI

DMR05-20020 (Goulian) 10/01/05-08/31/11

NSF/DMR

MRSEC IRG-3: Designed Programmable Membranes

Role: Co-Investigator

AHA fellowship (Roggiani) 07/01/09-06/30/11

Fellowship awarded to Manuela Roggiani

Information Processing and Cell to Cell Variability in a Bacterial Two-Component System

Role: Mentor

R01 GM080279 (Goulian) 09/01/09-05/31/11

(ARRA supplement)

NIH/NIGMS

Modeling and Analysis of Bacterial Signaling Circuits

Role: PI

Grand Challenges (Zhu) 5/1/2010-4/30/2011

Exploration in Global Health

Bill and Melinda Gates Foundation

Sentinel Commensals for in situ Temporal Protection against Bacterial Diarrhea

Role: Co-PI

R01 HL067286 (Janmey) 07/01/09-06/30/11

NIH/NHLBI

Novel Antibacterial Agents Resistant to Inactivation by Polyelectrolytes

Role: Co-Investigator

MCB0615957 (Goulian) 9/1/06-8/31/10
NSF/MCB
Imaging Two-Component Systems in *E. coli*
Role: PI

NIRT-0210777 (Boder) 9/1/02-6/30/07
NSF/BE
Combinatorial Engineering of Nanomachines: Building Novel Membrane Proteins via De Novo Design and Directed Evolution
Role: Co-PI

MCB021295 (Goulian)
NSF/MCB
Signal Transduction through the EnvZ/OmpR Two-Component Regulatory System

Pennsylvania Nano-Technology Institute 8/1/02-7/30/05
State of Pennsylvania
Role: Co-Investigator

BITS0130797 2/1/02-1/31/03
NSF
Modeling and Analysis of Biological and Information Networks
Role: Co-PI

Training Grant Participation

NIH Bacterial Pathogenesis and Genomics Training Grant
T32-AI060516 – Co-PI for 2015-2016
NIH Structural Biology Training Grant
T32-GM00827

Invited Conference Presentations

- Mathematical Sciences Research Institute, Berkeley, CA, Apr. 1991.
- March Meeting of the American Physical Society, Seattle, WA, Mar. 1992.
- Materials Research Society Fall Meeting, Boston, MA, Nov. 1994.
- March Meeting of the American Physical Society, Pittsburgh, PA, Mar. 1994.
- Condensed Matter Physics Gordon Research Conference, Wolfeboro, NH, Jul. 1995.
- March Meeting of the American Physical Society, Indianapolis, IA, Mar. 2002.
- IME Minisymposium, Systems Integration in Biomedicine, Univ. of Penn, Feb. 2003.
- Understanding Complex Systems Symposium, University of Illinois, Urbana, IL, May 20-21, 2003.
- FASEB Conference on Mechanism and Regulation of Prokaryotic Transcription, Saxton Rivers, VT, Jun. 21-26, 2003.
- Cells03: Workshop on Motion, Sensation, and Self-Organization in Living Cells, Dresden, Germany, Oct. 2003.
- Symposium on Post-Genomic Approaches to Studying Transcriptional Regulation, 104th American Society of Microbiology General Meeting, New Orleans, LA, May 2004.

- Theoretical Biology and Biomathematics Gordon Research Conference, Tilton, NH, Jun. 2004.
- Microbial Stress Response Gordon Research Conference, South Hadley, MA, Jul. 2004.
- FASEB Conference on Mechanism and Regulation of Prokaryotic Transcription, Saxton Rivers, VT, Jun. 2005.
- International Congress on Bacteriology and Applied Microbiology, Joint Meeting of IUMS, San Francisco, CA, Jul. 2005.
- Cellular Osmoregulation Gordon Conference, Newport, RI, August 2005.
- March Meeting of the American Physical Society, Baltimore, MD, March 2006.
- Workshop on Systems Properties and Evolution in Cell Signaling, Beijing, China, June 2006.
- 15th Annual International Meeting on Microbial Genomes, University of Maryland September 2007.
- Symposium on Systems Biology and Genetic Network Dynamics, 107th American Society of Microbiology General Meeting, Toronto, Canada, May 2007.
- Q-Bio Conference, St. John's College, Santa Fe, NM August 2007.
- Batsheva Seminar on Information Processing in Living Cells, Ein Gedi, Israel, March 2008
- Microbial Stress Response Gordon Research Conference, South Hadley, MA, Jul. 2008.
- ICAM Computational and Theoretical Biology Symposium, Rice University, TX, Dec. 2008.
- Annual Meeting of the American Society for Biochemistry and Molecular Biology, New Orleans, LA, Apr. 2009
- FASEB Meeting on Mechanisms and Regulation of Prokaryotic Transcription, Saxton Rivers, VT, Jun. 2009.
- Keynote Speaker, StoMP 2009. Noisy Bugs: Modeling and Microbiology, Edinburgh, Scotland, Jul 2009.
- Keynote Speaker, American Society of Microbiology, North Carolina branch meeting, Durham, NC. Oct. 2009.
- Sensory Transduction in Microorganisms Gordon Research Conference, Ventura, CA. Jan. 2010.
- Keynote Speaker, PRAT program awards ceremony, NIH, Jun. 2010.
- Frontiers of Multidisciplinary Research: Mathematics, Engineering, Biology, Exeter, UK. Sept. 2010.
- FASEB Meeting on Mechanisms and Regulation of Prokaryotic Transcription, Saxton Rivers, VT, Jun. 2011 – session chair and invited speaker.
- Microbial Stress Response Gordon Research Conference, South Hadley, MA, Jul. 2012.
- CIFAR Cellular Decision Making Workshop, Toronto, Canada, Nov. 2012.
- Workshop on a Systems Approach to Cell Based Sensing, Scottsdale, AZ, Nov. 2012.
- Stochastic Physics in Biology Gordon Research Conference, Ventura, CA, Jan. 2013.
- Annual Meeting of the American Society for Microbiology, Denver, CO, May 2013.
- Northwestern 3rd Annual Immunology and Microbiology Research Symposium, Chicago, IL, May 2013.
- FASEB Meeting on Mechanisms and Regulation of Prokaryotic Transcription, Saxton Rivers, VT, Jun. 2013.

- Society for General Microbiology, Annual Conference 2015, Mar. 29, 2015
- Conference on New Approaches and Concepts in Microbiology, Heidelberg, Germany, Oct. 2015

Invited Seminars and Colloquia

- Physics Dept. UCSB, Dec. 1992.
- Physics Dept. USC, Spring 1992.
- Physics Dept., Simon Fraser University, Spring 1992.
- Physics Dept., Harvard University, Spring 1992.
- Exxon Research and Engineering, Spring 1992.
- Institute for Advanced Study, Spring 1992.
- IBM, Almaden, Jan. 1993.
- Physics Dept., UCSB, Aug. 1994.
- Physics Dept., Stanford University, Fall 1994.
- Physics Dept., Berkeley, Fall 1994.
- Physics Dept., UCLA, Fall 1994.
- Physics Dept., University of Chicago, Spring 1995.
- Center for Studies in Physics and Biology, Rockefeller University, Spring 1995.
- Bell Labs, Spring 1995.
- IBM, Yorktown Heights, Spring 1995.
- NEC Research Institute, Jan. 1998.
- Physics Dept., Rice University, Jan 1998.
- Dept. of Chemical Engineering, Columbia University, Feb. 1998.
- Physics Dept., University of Vermont, Mar. 1998.
- Physics Dept., University of British Columbia, Apr. 1998.
- Bell Labs, Apr. 1998.
- Physics Dept., MIT, Apr 1998.
- Physics Dept., Princeton University, Spring 1998.
- Physics Dept., University of Pennsylvania, Spring 1999.
- Physics Dept., Stanford University, Apr. 1999.
- UCSF, May 1999.
- Physics Dept., Princeton University, May 1999.
- Physics Dept., Syracuse University, Nov. 1999.
- Chemistry Dept., University of Pennsylvania, Apr. 2001.
- Biology Dept., University of Penn., May 2001.
- Microbiology Dept., University of Pennsylvania, Oct. 2001.
- Dept. of Chemical Engineering, University of Pennsylvania, Nov. 2001.
- NEC Research Institute, Feb. 2002.
- Dept. of Biomedical Engineering, Northwestern University, Feb. 2002.
- Center for Studies in Physics and Biology, Rockefeller University, Apr. 2002.
- Microbiology Dept., Loyola Medical School, Sept. 2002.
- Bauer Center for Genomic Research, Harvard University, Sept. 2002.
- Physiology Dept., Cornell University School of Medicine, Dec. 2002.
- Physics Dept., Columbia University, Feb. 2003.
- Physics Dept., U. Mass. Amherst, Mar. 2003.
- Cell and Developmental Biology Seminar, University of Pennsylvania, Apr. 2003.

- Renaissance Technologies, Setauket, NY, Apr. 2003.
- Physics Dept., Ohio State University, Feb. 2004.
- Biology Dept., San Diego State University, Mar. 2004.
- Center for Theoretical Biological Physics, UCSD, Mar. 2004.
- Physics Dept., University of Pittsburgh, May 2004.
- Lambda Lunch, NIH, Jan. 2005.
- Institute for Biophysical Dynamics, University of Chicago, Feb. 2005.
- Dept. of Biochemistry and Molecular Biophysics, Washington University, Mar. 2005.
- Dept. of Bacteriology, University of Wisconsin-Madison, Mar. 2005.
- Physics Dept., Princeton University, Apr. 2005.
- Center for Studies in Physics and Biology, Rockefeller University, May 2005.
- Dept. of Physics, University of Pennsylvania, Sept. 2005.
- Dept. of Microbiology, Univ. of Illinois Urbana Champaign, Nov. 2005.
- Seminar, KITP, UCSB, Nov. 2005.
- Institute for Physical Science and Technology, University of Maryland, Nov. 2005.
- Systems Biology Seminar, UCSB, Feb. 2006.
- Dept. of Microbiology, U. Mass. Amherst, May. 2006.
- Physics Dept., NYU, Nov. 2006.
- Dept. of Microbiology, Columbia University, Dec. 2006.
- Biophysics Seminar, Princeton University, Apr. 2007.
- Center for Studies in Physics and Biology, Rockefeller University, Nov., 2007.
- Microbiology Seminar, Berkeley, Feb. 2008
- Theory Lunch, Department of Systems Biology, Harvard Medical School, Oct. 2008.
- Department of Biology, Villanova University, Nov. 2008.
- Microbiology Seminar, University of Pennsylvania, Nov. 2008.
- Microbiology Seminar, Temple University, Feb. 2009.
- Molecular and Cellular Biophysics Seminar, University of North Carolina, Apr. 2009.
- Seminar, IBM Thomas J. Watson Research Center, Apr. 2010.
- Institute for Biophysical Dynamics Seminar, University of Chicago, May 2010.
- Computations in Science, seminar, University of Chicago, May 2010.
- NIH Lambda Lunch Seminar, NIH, Jun. 2010.
- McGroddy Frontiers in Science Seminar, Saint Joseph's University, Feb. 16, 2011.
- Topics in Medical Physics Seminar, University of Pennsylvania, Feb. 23, 2011.
- Seminar, Dept. of Microbiology and Molecular Genetics, UMDNJ-NJMS, Apr. 12, 2011.
- Seminar, Physics Colloquium, Northwestern University, May 6, 2011.
- Seminar, Chemical Biology/Biochemistry Seminar, Indiana University, April 26, 2013.
- Seminar, Center for Studies in Physics and Biology, Rockefeller University, March 18, 2014.
- Bioinformatics Seminar, University of Delaware, Apr 14, 2014.
- Seminar, Max Planck Institute for Dynamics of Complex Technical Systems, Magdeburg, Germany, May 7, 2014
- Molecular Biology Institute Seminar, UCLA, Jan 7, 2015
- Microbiology Seminar, Harvard Medical School, Apr 21, 2015
- QBio Seminar, UCSD, May 11, 2015
- NIH Lambda Lunch Seminar, NIH, Nov. 5, 2015

- Cell Biology, Microbiology, and Genetics Seminar, University of Maryland, Nov. 6, 2015
- Biochemistry Seminar, CCNY, Nov. 18, 2015
- Biophysics Seminar, Johns Hopkins, Dec. 11, 2015
- Science at the Edge Interdisciplinary Seminar, Michigan State, Mar. 18, 2016
- Biological Chemistry Seminar, University of Pennsylvania, Mar. 2, 2017
- Microbiology Seminar, Northwestern University School of Medicine, Mar. 21, 2017
- Seminar, Center for Computational and Integrative Biology, Rutgers University, Camden, Apr. 4, 2017