

Emma L Peterman

PHD CANDIDATE · MIT CHEMICAL ENGINEERING

✉ emmap@mit.edu | 🏠 emmapeterman.netlify.app | 🐦 @emmapeterman_

Education

Massachusetts Institute of Technology

Cambridge, MA

PH.D. CHEMICAL ENGINEERING

2021 - 2026 (expected)

- Thesis: "Optimizing design of autonomous, multistable mammalian gene circuits for engineering regenerative cell therapies"
- Minor: Nucleic Acid-Based Control Systems

University of Delaware

Newark, DE

HONORS B.S. CHEMICAL ENGINEERING WITH DISTINCTION, MAGNA CUM LAUDE

2017 - 2021

- Thesis: "Computational and *In Vitro* Modeling of Aerosol Diffusion through Pulmonary Mucus to Optimize Viral Sponge Delivery for SARS-CoV-2 Treatment"
- Minor: Biochemical Engineering

Research Experience

Massachusetts Institute of Technology | Department of Chemical Engineering

Cambridge, MA

ADVISOR: DR. KATE E. GALLOWAY

2022 - Present

- Design genetic circuits to enable autonomous decision-making within mammalian cell populations
- Develop a model-based design framework for predictable and robust cell engineering through leveraging biophysical coupling of genes

University of Delaware | Department of Chemical and Biomolecular Engineering

Newark, DE

ADVISOR: DR. CATHERINE A. FROMEN

2018 - 2021

- Actualized lobe-specific targeting in 3D-printed airway replica by transforming a medical grade endotracheal tube, leading to a first-author peer reviewed publication and patent-pending prototype
- Spearheaded modeling of the lingual frenulum in patients with ankyloglossia as part of an interdisciplinary team including otolaryngologists from Nemours/Alfred I. duPont Hospital for Children, culminating in a manuscript and oral presentation

Scholarships & Fellowships

2022 - 2025	Graduate Research Fellowship, National Science Foundation
2021 - 2022	Edward Clark Walsh Presidential Fellowship, Massachusetts Institute of Technology
2020 - 2021	Mr. and Mrs. James F. Kearns Scholarship in Chemical Engineering, University of Delaware
2020 - 2021	Engineering Alumni Association Scholarship, University of Delaware
2020	NSF-REU, University of Pennsylvania LRSM (Cancelled due to SARS-CoV-2)
2019, 2020	Summer Scholars Science and Engineering Fellowship, University of Delaware
2018, 2019	Chemical Engineering Industrial Sponsors' Scholarship, University of Delaware
2017 - 2021	1743 Distinguished Scholarship, University of Delaware (Top 0.3% freshman applicants)

Awards & Honors

2021	Charles B. Evans Prize for Student Research, University of Delaware
2021	American Association of University Professors Student Prize, University of Delaware
2020	Future Leaders in Chemical Engineering, North Carolina State University
2020	Posters on the Hill Honorable Mention, Council on Undergraduate Research
2020	Barry Goldwater Scholarship Nominee, University of Delaware
2019	General Honors Award, University of Delaware
2018	Tau Beta Pi Engineering Honor Society, Delaware Alpha Chapter

Publications

PEER-REVIEWED PUBLICATIONS

3. **Peterman, E.L.**, Ploessl, D, Galloway, K.E. "Accelerating Diverse Cell-Based Therapies Through Scalable Design". *Annual Review of Chemical and Biomolecular Engineering*, In Review.
2. **Peterman, E.L.**, Kolewe, E.L, Fromen, C.A. "Evaluating Regional Pulmonary Deposition Using Patient-Specific 3D Printed Lung Models". *Journal of Visualized Experiments*, 165 (2020), e61706, doi: 10.3791/61706.
1. Briddell, J.W, Vandjelovic, N.D, Fromen, C.A, **Peterman, E.L.**, Reilly, J.S. "Geometric model to predict improvement after lingual frenulectomy for ankyloglossia". *International Journal of Pediatric Otorhinolaryngology*, 134 (2020), 110063, doi:10.1016/j.ijporl.2020.110063.

PATENTS

1. *Provisional (Not Converted)*: Fromen, C.A, **Peterman, E.L.**, Kolewe, E.L. "Endotracheal Tube Attachments for Inhalable Targeted Drug Delivery". U.S. Provisional Application Serial No.: 62/905,517. Submitted Sept 25, 2019.

Presentations

* presenting author

POSTER PRESENTATIONS

8. **Peterman, E.L.***, Beitz, A.M, Galloway, K.E. "Design of a single vector, multistable gene circuit for cell- fate determination". *Boston Mammalian Synthetic Biology*. Cambridge, MA, August 2023.
7. **Peterman, E.L.***, Kolewe, E.L, Gleghorn, J.P, Bartlett, B, Ford Versypt, A.N, Fromen, C.A. "Integrating Computational and *In Vitro* Modeling Techniques to Elucidate Mechanisms of Pulmonary Drug Delivery". *NCSU Future Leaders in Chemical Engineering Symposium*. Virtual, October 2020.
6. **Peterman, E.L.***, Kolewe, E.L, Bartlett, B, Ford Versypt, A.N, Fromen, C.A. "Leveraging Computational and *In Vitro* Modeling Techniques to Overcome Barriers to Pulmonary Drug Delivery". *University of Delaware Summer Research Symposium*. Virtual, August 2020.
5. Kolewe, E.L, **Peterman, E.L.**, Feng, Y, Fromen, C.A*. "Assessment Of Regional Aerosol Deposition In 3D Printed Lung Replicas". *ATS International Conference*. Philadelphia, PA, May 2020. (Conference canceled due to SARS-CoV-2)
4. Kolewe, E.L*, Briddell, J.W, **Peterman, E.L.**, Fromen, C.A. "Aerosol Deposition Patterns in 3D Printed Pediatric Throat Replicas". *ATS International Conference*. Philadelphia, PA, May 2020. (Conference canceled due to SARS-CoV-2)
3. **Peterman, E.L.***, Kolewe, E.L, Fromen, C.A. "Utilizing Endotracheal Tubes to Modulate Particle Deposition Profiles in a 3D-Printed Lung Model". *AIChE Annual Meeting*. Orlando, FL, November 2019.
2. **Peterman, E.L.***, Kolewe, E.L, Fromen, C.A. "Utilizing Endotracheal Tubes to Analyze and Manipulate Particle Deposition in a 3D-Printed Lung Model". *BMES Annual Meeting*. Philadelphia, PA, October 2019.
1. **Peterman, E.L.***, Kolewe, E.L, Feng, Y, Fromen, C.A. "Lobe-Specific Deposition of Inhaled Nanoparticles in an Intubated Lung Model". *University of Delaware Summer Research Symposium*. Newark, DE, August 2019.

ORAL PRESENTATIONS

1. Vandjelovic, N.D*, Briddell, J.W, Fromen, C.A, **Peterman, E.L.**, Johnston, D.R, Reilly, J.S. "A geometric model to explain the beneficial impact of lingual frenotomy for ankyloglossia in breastfeeding women". *Society for Ear, Nose, and Throat Advances in Children Annual Meeting*. Houston, TX, December 2018.

Teaching Experience

University of Delaware

Newark, DE

UNDERGRADUATE TEACHING ASSISTANT, DEPARTMENT OF CHEMISTRY AND BIOCHEMISTRY

2018 - 2020

- CHEM111/CHEM112 (Honors General Chemistry for Chemistry and Chemical Engineering Majors): Held weekly help sessions for students as well as writing and grading problems for exams and problem sets

GRADER, DEPARTMENT OF CHEMICAL AND BIOMOLECULAR ENGINEERING

2020

- CHEG332 (Chemical Engineering Kinetics): Supported professors for core junior course through grading assessments

Mentoring

MENTORING PROGRAMS

Massachusetts Institute of Technology

Cambridge, MA

CHEM UNDERGRAD/GRAD MENTORSHIP PROGRAM

2023 - Present

- Provide individual mentorship to undergraduate MIT ChemE students interested in applying to graduate school

CHEM APPLICATION MENTORSHIP PROGRAM (CHAMP)

2022 - Present

- Provide assistance to ChemE applicants from underrepresented groups and give feedback on application materials

FIRST-YEAR MENTORSHIP PROGRAM

2022 - Present

- Meet regularly with new first-year graduate students and provide advice on starting in a PhD program

INDIVIDUAL RESEARCH MENTORING

Clara Robinson 2023

Homeschool Internship Program for Science and Technology (HIP-SAT), MIT

Charis Ching 2022 - 2023

National Institutes of Health Step-Up Program, Stanford University

2022

Homeschool Internship Program for Science and Technology (HIP-SAT), MIT

Outreach & Professional Development

SERVICE AND OUTREACH

Cambridge School Volunteers

Cambridge, MA

NETPALS MENTOR

2023 - Present

- Provide one-on-one STEM mentorship to local seventh grade students through email correspondence and in-person visits

Science Club for Girls

Cambridge, MA

SCFGLIVE VIDEO EDITOR

2021

- Produced educational videos on STEM topics, such as photosynthesis and density, for distribution on Comcast

University of Delaware K-12 Outreach

Newark, DE

CONTENT DEVELOPER

2020 - 2021

- Designed an educational module on engineering vaccines in collaboration with Fromen Lab members for distribution to local high schools

Serviam Girls Academy

Wilmington, DE

VIRTUAL MATH TUTOR

2020

- Held weekly tutoring sessions on math and science topics to assist students from under-resourced homes in adjusting to online schooling amid the COVID-19 pandemic

University of Delaware Alternative Breaks Program

Newark, DE / Pittsburgh, PA

GWEN'S GIRLS TEAM

2017 - 2018

- Volunteered at Gwen's Girls After-School Program
- Taught science lessons (ex. Non-Newtonian fluids) and provided math tutoring to middle school students
- Performed maintenance and administrative support tasks

Deep Roots STEM Outreach Program

Newark, DE

VOLUNTEER

2017 - 2018

- Led interactive science demonstrations to engage K-12 students in the community and increase interest in STEM fields
- Supervised chemical use and communicated the importance of proper safety precautions

PROFESSIONAL MEMBERSHIPS

- Society of Women Engineers (SWE)
- Biomedical Engineering Society (BMES)
- American Institute of Chemical Engineers (AIChE)