Emma L Peterman

PhD Candidate · MIT Chemical Engineering

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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*

ChemE Undergrad/Grad Mentorship Program *2023 - Present*

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

Massachusetts Institute of Technology *Cambridge, MA*

ChemE 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 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)