# Emily E. Ackerman, Ph.D.

*Postdoctoral Researcher in the Lahav Lab, Systems Biology, Harvard Medical School*

**Computational researcher with wide-ranging skill set including network biology, mathematical modeling, and single cell sequencing methods. Experience with viral infection and cancer applications. Committed to creating an equitable scientific enterprise for all.**

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## Education

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| August 2021 | Doctor of Philosophy in Chemical Engineering<br>**University of Pittsburgh**, Pittsburgh, PA \| Advisor: Dr. Jason Shoemaker |
| May 2015 | Bachelor of Science in Chemical Engineering<br>**Rensselaer Polytechnic Institute**, Troy, NY |

## Research Experience

**Aug 2021-Current** — Department of Systems Biology
**Harvard Medical School** | Dr. Galit Lahav | *Postdoctoral Research*

Prepared methods to analyze novel, linked single cell p53 protein dynamics and gene expression. Applied time series clustering to p53 dynamics post-DNA damage. Developed analytic pipeline to evaluate common characteristics in dynamics across cells. Assessed heterogeneity in scRNAseq data of the MCF7 cell line post-DNA damage to determine common genetic profiles.

Investigated the role of TP53 mutations and comutated genes in four common categories of myeloid neoplasia with applications in clinical diagnostics.

**Jan 2016-Aug 2021** — Department of Chemical and Petroleum Engineering
**University of Pittsburgh** | Dr. Jason Shoemaker | *Doctoral Research*

Identified host factors of influenza infection using virus-host protein network topology and controllability analyses. Evaluated network methods against high throughput biological screening methods.

Trained a novel ODE model of the host immune response to capture strain-specific influenza infection pathology. Developed software to perform shared parameter fitting on multiple data sets using Markov Chain Monte Carlo and genetic algorithms. Reviewed current intrahost immune response models for viral titers' sensitivity to several immune components as well as their ability to capture the effects of interferon pre-treatment.

Prioritized drug repositioning candidates for SARS-CoV-2 infection using network controllability methods. Participated in the international COVID-19 Disease Map effort to coalesce known molecular mechanisms of COVID-19.

**Jun 2015-Aug 2015** — Intern at **Albany Molecular Research Inc.**
*Computer-Aided Drug Discovery*

Worked on a team of professionals towards the development of in-house docking/scoring methods for protein interactions. Optimized and automated all methods for department-wide use. Verbally presented results with all non-computational departments and management teams at end of term.

**May 2013-May 2015** — Undergraduate Research Program
**Rensselaer Polytechnic Institute** | Dr. Curt Breneman | *Undergraduate Research*

Identified potential microbicide ligands to inhibit HIV GP120-CD4 binding. Used high-throughput screening methods to assemble a library of drug-like leads. Developed novel super-flexible docking/scoring method with binding site comparison in Autodock Vina and MOE. Assisted small team in writing an R21 NIH grant proposal.

## Honors and Awards

Sept 2021-Sept 2023 | Research Supplement to Promote Diversity in Health-Related Research from the **National Institutes of Health (NIH)**

Apr 2021 | Outstanding Research Assistant at the **University of Pittsburgh**
*Awarded by the Engineering Graduate Student Organization*

Feb 2021 | Dr. James Coull Memorial Fellowship Award for the **Department of Chemical Engineering, University of Pittsburgh**
*Awarded annually to one senior Ph.D. student*

Dec 2019 | Outstanding Ph.D. Paper, Summer 2019 for the **Department of Chemical Engineering, University of Pittsburgh**
*"A Dual Controllability Analysis of Influenza Virus-Host Protein-Protein Interaction Networks for Antiviral Drug Target Discovery"*

Feb 2019 | Chemical Engineering Department Research Day at the **University of Pittsburgh**
*OXE Research Award, Best Oral Presentation*
*"Network Methods for Identifying Regulators of Influenza A Virus"*

Sept 2018-Aug 2021 | James H. Gilliam Fellowships for Advanced Study program at the **Howard Hughes Medical Institute**
*Gilliam Fellow*

Mar 2017 | **NSF** Graduate Research Fellowship
*Honorable Mention*

Mar 2017 | McGowan Institute for Regenerative Medicine (MIRM)
*Best poster, Computation and Modeling: Third place*
*"Controllability Analysis of Protein-Protein Interaction Networks for Anti-Viral Drug Development"*

## Professional Leadership and Service

Dec 2021-*Current* | Disability Advisor for the **Department of Systems Biology** at **Harvard Medical School**
Provided guidance to department leadership on accessibility of physical space, websites, etc. Acted as liaison between students, researchers, staff, and department administration concerning disability issues. Established virtual community for disabled researchers within Harvard Medical School. Created new onboarding materials regarding procedures for making accessibility improvements in lab spaces.

Aug 2020-*Current* | Board of Directors of **Future of Research**
Co-led the Labor Task Force for the investigation of graduate student and postdoc labor issues. Conceived and carried out large scale survey of workplace conditions for academic early career researchers. Worked with Board of Directors and Executive Board to empower junior researchers through equitable, grassroots action.

Jan 2023-Jun 2023 | Committee Member for **Beyond Compliance: Promoting the Success of People with Disabilities in the STEM Workforce** at the **National Academies of Sciences, Engineering, and Medicine (NASEM)**
Organized and hosted five day workshop to explore issues related to the accessibility and inclusivity of STEM workplaces. Created lasting resources in the form of video recordings and conference proceedings.

# Professional Leadership and Service Cont.

Dec 2022-Dec 2023 | Member of the **Advisory Committee to the Director - Working Group on Re-envisioning NIH-Supported Postdoctoral Training** at the **National Institutes of Health (NIH)**

Engaged with key parties to evaluate factors contributing to the declining number of U.S. postdoctoral researchers. Reported evidence and wrote recommendations to optimize both the postdoctoral training experience and the scientific enterprise overall.

Sept 2021-Jun 2022 | Committee Member for the **Committee on Leading Practices for Improving Accessibility and Inclusion in Field, Laboratory, and Computational Science** at the **National Academies of Sciences, Engineering, and Medicine (NASEM)**

Organized and hosted five webinars including keynotes and guided Q&A with disabled speakers to discuss the current state STEM research for disabled researchers and provide recommendations for the future. Created lasting resources in the form of video recordings.

May 2021 | Organizer of the **Valuing Disabled Voices in STEM Workshop** at the **University of Pittsburgh**

Conceived and organized a workshop to highlight the experiences and research of disabled faculty and students.

Jan 2020-Jun 2021 | Co-founder, executive board of the **Transforming Academic Ecosystems (TAE) Consortium**

Established peer efforts to address the mental health needs of graduate students from underrepresented groups. Held weekly meetings to guide and act on initiatives. Created and maintained website and social media. Attended monthly meetings with Howard Hughes Medical Institute administrators to set up mental health sessions at 2020 annual Gilliam Fellowship meeting.

Sept 2018-Dec 2018 | Model Client for the **Research Experience for Teachers Program (RET)**
*Human Engineering Research Laboratories, University of Pittsburgh*

Attended weekly meetings with 5 area STEM teachers to serve as a model client throughout the design and prototyping of an automated grabber tool. Educated teachers about how to interact with disabled clients during the design process and how engineering can impact disabled lives.

Aug 2017-Aug 2021 | Organizer with Pitt Graduate Student Organizing Committee
**University of Pittsburgh**

Led unionization efforts in school of engineering through extensive communication with peers. Organized across the university to assess the needs of Pitt's graduate workers. Planned STEM-wide and university-wide events.

Jan 2017-May 2020 | President of Graduate Women Engineering Network
**University of Pittsburgh**

Prepared workshops on skills and topics which benefit members such as pay negotiation, navigating impostor syndrome, and Title IX panels. Organized social events and peer mentoring groups for women in STEM to network. Planned and lead general body meetings and executive board meetings. Worked with administration to coordinate events.

Nov 2018 | GWEN Representative for Women Students' Networking Conference
**University of Pittsburgh**

Worked with administrators, faculty, and student organizations from the Swanson School of Engineering to plan a half-day conference for undergraduate students. Presented to students and industry representatives.

Feb 2018 | Co-planner for Women in STEM Conference
**University of Pittsburgh**

Arranged a full day of sessions for graduate women covering technical writing, succeeding in any career, time management, and more. Organized and judged undergraduate and graduate poster competitions. Planned in parallel with SWE undergraduates and graduate students.

## Professional Leadership and Service Cont.

Jan 2016-Jan 2017 | Social Media Coordinator of Graduate Women Engineering Network
**University of Pittsburgh**
Responsible for all communication between executive board and general members. Planned social events for women in STEM to network. Attended executive board meetings.

Oct 2016 | Volunteer at ChemFest (National Chemistry Week Celebration)
**Carnegie Science Center**
Demonstrated and carried out basic experiment about Bernoulli's Principle with kids ages 2-14 to raise interest in STEM. Taught scientific principles of experiment to older age group (10-14).

## Peer-Reviewed Publications

Submitted | *Simerzin A., Ackerman E., Fujimaki K., Kohler R., Iwamoto Y., Weissleder R., Jambhekar A. & Lahav G. (2024)* "Cell Confluency Affects p53 Dynamics in Response to DNA Damage". *Molecular Biology of the Cell*

Published | *Jambhekar A., Ackerman E., Alpay B., Lahav G., & Lovitch S. (2024)* "Comparison of TP53 Mutations Across the Spectrum of Myeloid Malignancies Suggests Divergent Functional Roles in Initiation of Myelodysplasia and Progression to Acute Leukemia". *Blood Neoplasia*

Published | *Ackerman E., Weaver J., & Shoemaker J. (2022)* "Disparate Interferon Production Rate Drives Strain-Specific Immunodynamics of Influenza A Virus". *MDPI Viruses*

Published | *Bennett C., Ackerman E., Carrington P., & Fox S. (2020)* "Accessibility and The Crowded Sidewalk: Micromobility's Impact on Public Space". *Proceedings, 2021 ACM Designing Interactive Systems (DIS) conference*

Published | *Ackerman E., & Shoemaker J. (2020)* "Network Controllability-Based Prioritization of Candidates for SARS-CoV-2 Drug Repositioning". *MDPI Viruses*

Published | *Ackerman E., Mochan E., & Shoemaker J. (2019)* "Strain-Specific Immune Response to Influenza Virus Infection". *Part of special issue: 8th Conference on Foundations of Systems Biology in Engineering FOSBE 2019*

Published | *Ackerman E., Alcorn J., Hase T., & Shoemaker J. (2019)* "A Dual Controllability Analysis of Influenza Virus-Host Protein-Protein Interaction Networks for Antiviral Drug Target Discovery". *BMC Bioinformatics*

Published | *Ackerman E., Kawakami E., Katoh M., Watanabe, Watanabe T., Tomita Y., Lopes T., Matsuoka Y., Kitano H., Shoemaker J. & Kawaoka Y. (2018)* "Network-Guided Discovery of Influenza Virus Replication Host Factors". *mBio*

Published | *Ackerman E., Mochan E., & Shoemaker J. (2018)* "A systems and treatment perspective of models of influenza virus-induced host responses". *MDPI Processes*

## Research Presentations

Apr 2023 | Co-presented Talk
"Distinct TP53 mutation spectra in myeloid neoplasms suggest divergent roles in disease initiation and progression"
*Ludwig Center Weekly Meeting,* **Harvard Medical School**

Nov 2022 | Poster
"Comparison of TP53 Mutations Across the Spectrum of Myeloid Malignancies Suggests Divergent Functional Roles in Initiation of Myelodysplasia and" Progression to Acute Leukemia"
*Ludwig Center Annual Meeting,* **Harvard Medical School**

Aug 2022 | Poster
"Time Series Clustering for the Integration of p53 Protein Dynamics and Transcriptomics in Single Cells"
*NIH Diversity Supplement Professional Development and Networking Workshop,* **National Institutes of Health (NIH)**

Nov 2021 | Invited Talk
"Controls Engineering Approaches to Regulating Immunity During Respiratory Infection"
*U-RISE Seminar Speaker,* **University of Maryland, Baltimore County**

Oct 2021 | Talk
"Interferon Production Rate is a Major Contributor to Differential Strain-Specific Immunodynamics"
*5th Workshop on Virus Dynamics,* **Fred Hutchinson Cancer Research Center**

Jul 2020 | Talk
"Identifying Regulators of Infection in Virus-Host Networks"
*International Conference on Intelligent Systems for Molecular Biology, ISMB,* **Virtual**

May 2019 | Poster
"Network Methods for Identifying Regulators of Influenza A Virus Infection
*International Conference on Research in Computational Molecular Biology, RECOMB,* **George Washington University**

Feb 2019 | Talk
"Network Methods for Identifying Regulators of Influenza A Virus Infection
*Chemical Engineering Department Research Day,* **Pittsburgh, PA**

Oct 2018 | Invited Talk
"Controllability of the Influenza Virus-Host Protein-Protein Interaction Network: Engineering Insights into Host-Virus Interactions
*American Institute of Chemical Engineers, Annual Meeting,* **Pittsburgh, PA**
*Area Plenary: Future Directions in Applied Mathematics and Numerical Analysis*

Jun 2017 | Poster
"Controllability Analysis of Protein-Protein Interaction Networks for Anti-Viral Drug Development"
*American Society of Virology Meeting,* **University of Wisconsin, Madison**

Mar 2017 | Poster
"Controllability Analysis of Protein-Protein Interaction Networks for Anti-Viral Drug Development"
*McGowan Institute for Regenerative Medicine,* **University of Pittsburgh**

Apr 2014 | Poster
"Determination of GP120 binding site to CD4 and CD4 Mutations"
*Undergraduate Research Symposium,* **Rensselaer Polytechnic Institute**

## Teaching Experience

Fall 2016-2018 | Teaching Assistant at the **University of Pittsburgh**
*Systems Engineering 1: Dynamics and Modeling* | Dr. Jason Shoemaker
Taught recitation for senior undergraduates twice a week, including new concepts and practice problems. Planned and taught guided simulations in MATLAB and Simulink. Provided extra examples of challenging material after skill assessments. Held office hours each week to provide individual support to student learning.

## Invited Lectures and Panels on Equity

April 2024 Talk | "Diversity - Inclusion and Accessibility"
*Research and Application in Team Science Committee,* **National Academies of Sciences, Engineering, and Medicine (NASEM)**

April 2024 Panel | "Becoming a Researcher: Inclusion and Accessibility in the Lab Environment"
*Inclusion, Diversity, Equity, and Antiracism Series (IDEAS),* **Association of American Medical Colleges (AAMC)**

Jan 2024 Panel | "Roles, Responsibilities, and Expectations of Graduate Students and Postdoctoral Scholars: The Current Landscape and History of Graduate Student and Postdoctoral Scholar Labor Movements"
*Roundtable on Mentorship, Well-being, and Professional Development,* **National Academies of Sciences, Engineering, and Medicine (NASEM)**

July 2023 Talk | "Creating an Anti-Ableist Future for Science"
*DEI Speaker Series,* **National Academies of Sciences, Engineering, and Medicine (NASEM)**

Jan 2023 Talk | "Accessibility and Inclusion Conversation Series"
*Distinguished Lecture,* **National Science Foundation**

Sept 2020 Talk | "The Disability and Tech Accessibility Cycle"
*Pitt Grad Student Organizing Committee, STEM and Society Lecture Series,* **University of Pittsburgh**

Apr 2020 Talk | "The Accessibility Gap for Tech Users and Developers"
*Carnegie Mellon University, Accessibility Group,* **Pittsburgh, PA**

## Activist Media

Aug 2021 | *Ward A.,* ***Ackerman E.,*** "Systems Biology (MEDICAL MATHEMATICS) with Emily E. Ackerman". *Ologies*

Mar 2021 | ***Ackerman E.,*** "Redefining Accessibility in Design with Disabilities Advocate Emily Ackerman". *Girlboss Radio*

Mar 2021 | ***Ackerman E.,*** "My Year of Nothing but Everything: Living in Pennsylvania During COVID-19". *Disability Visibility Project*

Dec 2020 | *Wong A.,* ***Ackerman E.,*** "Disabled Engineers". *Disability Visibility Project Podcast*

## Activist Media Cont.

Jan 2020 | *Clegg A.,* "How to design AI that eliminates disability bias". *Financial Times*

Nov 2019 | ***Ackerman E.,*** "My Fight With a Sidewalk Robot". *Bloomberg CityLab*

## Competition and Innovation Experience

**Scientific Literature Mining**: Created data mining tool for application to COVID-19 scientific literature database. Collaborated as scientific consultant for Neubig Group, a natural language processing team at CMU.

Apr 2020 | COVID-19 Open Research Dataset Challenge (CORD-19) - Round 1
**AI2, CZI, MSR, Georgetown, NIH & The White House**

**EXGBuds**: Wearable over the ear EEG device for controlling technology using eye movement. Designed and marketed with interdisciplinary team of engineers.

Jun 2017 | ABB Robotics IdeaHub - Semi-final round
*How can a prototype enhance the way robots interact with humans?*
**ABB Robotics, Venture:Bright**
Delivered project idea in semi-final interview with investors (Top 20 shortlisted teams out of hundreds of applicants). Prepared to pitch in final round in October, 2017.

Apr 2017 | Kuzneski Innovation Cup Competition - Final round
*What innovations can impact people's lives in areas other than healthcare?*
**University of Pittsburgh, Innovation Institute**
Prepared to pitch product in final Innovation Showcase in October, 2017 for prize of $15,000.

Apr 2017-Sep 2017 | Pitt Innovation Challenge (PINCH) - First and second rounds completed
*How can we use wearable technology to address an important health problem?*
**University of Pittsburgh, Clinical and Translational Science Institute, Innovation Institute**
Created introductory video to communicate technology visually. Wrote project proposal including scale up and budget projections for possible prize of $100,000.

**Systems Biology Video**: Conceptualized and created an animated video highlighting basic concepts in systems biology. Targeted material to high school students to generate interest in the field. Created in a group of two using Blender.

Sep 2016 | Vizzies Visualization Challenge - Submitted
**National Science Foundation**

## Computer Skills

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| Advanced Knowledge: | R, Python, Matlab, Seurat, Excel, Word, PowerPoint, Git, Bash, Mac OS, Linux (ubuntu), LaTeX |
| Basic Knowledge: | html, Perl, Blender, MOE, AutoDock, AutoDock Vina, Pymol, Aspen Plus, Simulink, comsol |