Robert W. Gregg

Postdoctoral Researcher	University of Florida
Email	r.gregg@ufl.edu
Website	https://robertgregg.github.io/

Education

July 2020 | **Doctor of Philosophy in Chemical Engineering** — GPA: 3.9/4.0
University of Pittsburgh
Advisor: Dr. Jason Shoemaker
Thesis: Multi-Scale Modeling of the Innate Immune System: A Dynamic Investigation into Pathogenic Detection

May 2015 | **Bachelor of Science in Chemical Engineering** — GPA: 3.6/4.0
Minor in Mathematics
University of Rochester

Research Experience

July 2020-Present | **Postdoctoral Fellow with Dr. Takis Benos**

Department of Department of Epidemiology, College of Medicine, University of Florida

Employed probabilistic graphical modeling tools to determine which clinical, genetic, and imaging measurements from the COPDGene study exhibited a causal relationship to early-stage COPD progression.
Trained supervised machine learning models to predict early COPD progression using the identified variables from causal modeling.
Worked alongside pulmonary clinicians to analyze epigenetic data (450K methylation) in COPD patients and improved algorithms to handle these large datasets

Jan. 2016-July 2020 | **Graduate Student Researcher**

Department of Chemical and Petroleum Engineering, University of Pittsburgh

Developed multi-scale ODE/Agent-Based models of the cGAS pathway to investigate the impact of stochasticity in cell populations.
Implemented parallel tempering Markov Chain Monte Carlo (PT-MCMC) methods for parameterization on a Linux computing cluster.
Performed read alignment and differential gene expression analysis on time course RNA-seq data in R. Carried out RT-qPCR experiments using ISD transfected BJ-TERT (human fibroblast) cells.

May 2014-July 2014 | **NSF: Research Education for Undergraduates (REU)**

Department of Immunology, University of Pittsburgh

Modeled the spatial and temporal patterns associated with granuloma formation in tuberculosis. Learned to segment PET/CT lung scans using Osirix and transfer data into Matlab to simulate disease dynamics.

Jan. 2014-Apr. 2014 | **Undergraduate Independent Study**

Department of Imaging Sciences, University of Rochester

Investigated the quantum chemical phenomena underpinning photodynamic therapy and its role as a curative and palliative treatment for cholangiocarcinoma. Reviewed literature on current photosensitizer drugs used to generate reactive oxygen species in malignant tumors.

Teaching Experience

Dec. 2020-Jan. 2023 | **Literacy Pittsburgh Tutor**

Volunteered two hours a week to prepare non-traditional students for the GED. Completed multiple workshop training sessions to become proficient in Adult Basic Education. Developed lesson plans and homework problems to reinforce critical mathematical and reading concepts.

Sep. 2016-Dec. 2018 | **Teaching Assistant**

Introduction to Engineering Analysis

Taught 75 incoming freshman engineering students from a wide range of skill levels and backgrounds essential computer skills including Excel, Unix, and HTML/JavaScript. Participated in every lecture troubleshooting coding assignments and grading homework problem sets.

Process Control Dynamics

Prepared and taught recitation for senior undergraduates twice a week, including new concepts and practice problems. Planned and guided students through simulations in MATLAB and Simulink. Provided extra examples and skill assessments to explain challenging material. Held office hours each week to provide individual support to student learning.

Jun. 2015-Aug. 2015 | **Upward Bound: High School Course Instructor (Massachusetts)**

Instructed two sections of Calculus and one section of Differential Equations for the federally funded Upward Bound Program (B.S. degree required). Prepared low-income, first generation, college bound high school students for success in higher level mathematics in the upcoming school year and college. Developed curricula, homework problem sets, examinations, and projects integrating use of Mathematica

Jan. 2012-May 2015 | **Upward Bound: Tutor and Mentor (New York)**

Volunteered and tutored local high school students in the Rochester City School District. Guided students through challenging math and science coursework to help reinforce key learning objectives taught in class. Worked closely with low-income, minority, and ESL students to improve writing skills for college applications

Peer Reviewed Publications

PLoS Medicine | **Gregg, Robert W.**, Chad M. Karoleski, Edwin K. Silverman, Frank C. Sciurba, Dawn L. DeMeo, and Panayiotis V. Benos. "Identification of factors directly linked to incident chronic obstructive pulmonary disease: A causal graph modeling study." PLoS medicine 21, no. 8 (2024): e1004444. https://doi.org/10.1371/journal.pmed.1004444

Bioinformatics | **Robert W Gregg**, Panayiotis V Benos, CellularPotts.jl: Simulating Multiscale Cellular Models in Julia, Bioinformatics, 2024. https://doi.org/10.1093/bioinformatics/btad773

American Journal of Respiratory and Critical Care Medicine | Elizabeth A Regan, Melissa E. Lowe, Barry J. Make, Jeffrey L Curtis, Quan (Grace) Chen, James L Crooks, Carla Wilson, Gabriela R Oates, **Robert W Gregg**, Arianne K. Baldomero, Surya P Bhatt, Alejandro A Diaz, Panayiotis V Benos, James K O'Brien, Kendra A Young, Gregory L. Kinney, Douglas J Conrad, Katherine E Lowe, Dawn L DeMeo, Amy Non, Michael H Cho, Julia Kallet , Marilyn G Foreman, Gloria E Westney, Karin Hoth, Neil R MacIntyre, Nicola Hanania, Amy Wolfe, Hannatu Amaza, MeiLan Han, Terri H. Beaty, Nadia N Hansel, Meredith C McCormack, Aparna Balasubramanian, James D Crapo, Edwin K Silverman, Richard Casaburi, Robert A. Wise "Early Evidence of COPD Obscured by Race-Specific Prediction Equations" (2023). https://doi.org/10.1164/rccm.202303-0444OC

Bioinformatics | **Robert W Gregg**, Fathima Shabnam, Jason E Shoemaker "Agent-based modeling reveals benefits of heterogeneous and stochastic cell populations during cGAS-mediated IFNβ production" (2020). https://doi.org/10.1093/bioinformatics/btaa969

Journal of Infectious Disease | Satoshi Fukuyama, Kiyoko Iwatsuki-Horimoto, Maki Kiso, Noriko Nakajima, **Robert W Gregg**, Hiroaki Katsura, Yuriko Tomita, Tadashi Maemura, Tiago Jose da Silva Lopes, Tokiko Watanabe, Jason E Shoemaker, Hideki Hasegawa, Seiya Yamayoshi, Yoshihiro Kawaoka "Pathogenesis of influenza A (H7N9) virus in aged non-human primates" The Journal of Infectious Diseases (2020). https://doi.org/10.1093/infdis/jiaa267

Journal of Theoretical Biology | **Gregg, Robert W.**, Saumendra N. Sarkar, and Jason E. Shoemaker. "Mathematical Modeling of the cGAS Pathway Reveals Robustness of DNA Sensing to TREX1 Feedback." Journal of theoretical biology (2018). https://doi.org/10.1016/J.JTBI.2018.11.001

IFAC | **Gregg, Robert W.**, Saumendra Sarkar, and Jason E. Shoemaker. "Examining Dynamic Emergent Properties of the DNA Sensing Pathway." IFAC-PapersOnLine 51.19 (2018). https://doi.org/10.1016/J.IFACOL.2018.09.017

Radiology of Infectious Diseases | **Gregg, Robert W.**, Pauline Maiello, H. Jacob Borish, M. Teresa Coleman, Douglas S. Reed, Alexander G. White, JoAnne L. Flynn, Philana Ling Lin, "Spatial and temporal evolution of lung granulomas in a cynomolgus macaque model of Mycobacterium tuberculosis infection." Radiology of Infectious Diseases 5.3 (2018). https://doi.org/10.1016/j.jrid.2018.08.001

PLOS Pathogens | Philana Ling Lin , Pauline Maiello, Hannah P. Gideon, M. Teresa Coleman, Anthony M. Cadena, Mark A. Rodgers, **Robert Gregg**, Melanie O'Malley, Jaime Tomko, Daniel Fillmore, L. James Frye, Tara Rutledge, Robert M. DiFazio, Christopher Janssen, Edwin Klein, Peter L. Andersen, Sarah M. Fortune, JoAnne L. Flynn. "PET CT identifies reactivation risk in cynomolgus macaques with latent M. tuberculosis." PLoS Pathog 12, no. 7 (2016). https://doi.org/10.1371/journal.ppat.1005739

Trainings

June 2022 | **Epigenetics Boot Camp at Columbia University**

Planning and Analyzing DNA Methylation Studies for Human Populations

Developed data analytic skills during an intensive two-day boot camp of seminars and hands-on coding sessions capable of processing human epigenetics studies focused on DNA methylation.

Invited Presentations

June 2023 Taormina, Italy | **Math 2 Product (M2P) Emerging Technologies in Computational Science for Industry, Sustainability, and Innovation**

Simulating Multiscale Cellular Models with CellularPotts.jl

Robert W. Gregg

Media Coverage

Jan 2025 | **University of Florida PHHP Newsroom**

UF researchers leverage AI to predict factors influencing lung disease

https://phhp.ufl.edu/2025/01/08/uf-researchers-leverage-ai-to-predict-factors-influencing-lung-disease/

Oct 2017 | **Pittsburgh Post-Gazette**

Pitt researchers developed a VR game about viruses, but it wasn't easy to get onto the app store

https://www.post-gazette.com/business/tech-news/2017/10/04/university-of-pittsburgh-pitt-virtual-reality-game-shoemaker-immunosystems-lab/stories/201709270123

Oct 2017 | **Pitt Swanson Engineering Virtual News Room**

"Cellular" Biology. Pitt Engineers Develop Virtual Reality Game for Smartphones to Teach Young People about the Immune System

https://news.engineering.pitt.edu/cellular-biology/

Conferences

Presentation May 2024 | **American Thoracic Society**

Using Causal Discovery Methods to Identify Predictors for Incident Lung Function Decline in COPD

Robert. W. Gregg, Edward K. Silverman, Frank C. Sciurba, Dawn. L. DeMeo, P anayiotis. V. Benos

Presentation June 2022	**National Library of Medicine (NLM) T15 Training Conference** *Causal Inference of DNA Methylation Identifies a Subtype of COPD Patients with Increased Survivability* Robert W. Gregg, Dawn L. DeMeo, Panayiotis V. Benos
Poster May 2022	**American Thoracic Society** *Causal Inference of DNA Methylation Identifies a Subtype of COPD Patients with Increased Survivability* Robert W. Gregg, Dawn L. DeMeo, Panayiotis V. Benos
ePoster Sept. 2021	**European Respiratory Society International Congress** *Leveraging causal modeling to predict early-stage COPD progression* Robert W. Gregg, Panayiotis V. Benos
Presentation Nov. 2019	**American Institute of Chemical Engineers** *Quantifying the Impact of Cellular Heterogeneity on cGAS Pathway Regulation using Multiscale Agent-Based Modeling* Robert W. Gregg, Jason E. Shoemaker
Presentation Oct. 2018	**American Institute of Chemical Engineers** *Using Uncertainty to Assess Feedback Mechanisms in the Innate Immune DNA Sensing Pathway* Robert W. Gregg, Jason E. Shoemaker
Poster Aug. 2018	**Foundations of Systems Biology in Engineering** *Examining Dynamic Emergent Properties of the DNA Sensing Pathway* Robert W. Gregg, Sarkar N. Saumendra, Jason E. Shoemaker
Presentation Oct. 2017	**American Institute of Chemical Engineers** *Dynamic Analysis of the DNA Sensing Pathway Predicts Host Immune Response* Robert W. Gregg, Jason E. Shoemaker
Poster June 2017	**American Society for Virology** *Mathematical Modeling of the Viral DNA Sensing Pathway Predicts Antiviral Host Responses* Robert W. Gregg, Jason E. Shoemaker

Outreach

Feb 2023- Present	**Education Outreach (Salk Institute for Biological Studies)** Volunteered with the Salk mobile science lab to help middle school aged students learn about microscopes, isolating plant DNA, and DNA analysis.

Aug 2019- Dec. 2019	**Reviewer for Ingenium: An Undergraduate Research Journal** Served on the Graduate Student Editorial Board for Ingenium, a yearly peer-reviewed compilation of articles highlighting undergraduate research within the Swanson School of Engineering. Provided critical reviews for abstract and manuscript selection in bio-engineering and chemical engineering.
Jan 2017- June 2018	**Vir-ed: Educational VR Application** Led and managed a team of software engineers at Full Sail University to develop an educational virtual reality app teaching users about my PhD research. Communicated with non-experts to simplify complex biochemistry resulting in a gaming experience where users learn how viruses cause infections. The free app is available on the Google play store, search: *Vir-ed*.
Oct 2016	**Volunteer at ChemFest (National Chemistry Week Celebration)** 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).
Sept. 2016	**NSF "Vizzies" Visualization Challenge - [Video Submitted](#)** 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.

Awards and Funding

2024	Google Cloud for Researchers Credits ($5,000)
2021-2023	National Library of Medicine (NLM) T15 Training Grant Fellowship
2019	Engineering Graduate Student Organization (EGSO) Travel Grant ($1,000)
2016	Wellington C. Carl Pittsburgh Foundation Scholarship ($10,000)
2011-2015	Koller-Diez Centennial Scholarship ($160,000)
2013	Clifton Rehabilitative Nursing Center Scholarship ($500)
2011-2015	Durfee Alumni Scholarship ($10,000)
2011	John Pimental Memorial Scholarship ($1,000)
2011	Bausch and Lomb Honorary Science Award
2011	John and Abigail Adams Scholarship ($13,000)
2010	Mildred C. Carrol Book Award
2005	Fall River Dollars for Scholars Scholarship ($150)

Software Skills

Advance	MatLab/Simulink, Microsoft Office, R, Julia, Latex
Intermediate	Linux (ubuntu), Mathematica, Osirix, Blender, Python, Git
Basic	Solid Works, PTC Creo, LabView, HTML, JavaScript

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