CURRICULUM VITAE
The Johns Hopkins University School of Medicine

Ellis Reed Crabtree, PhD   August 18, 2025

DEMOGRAPHIC AND PERSONAL INFORMATION

Current Appointments

University
None

Hospital
2025-Present   Predictive Analytics Data Scientist, Department of Predictive Analytics, Johns Hopkins All Children's Hospital

Other
None

Personal Data

Business Address	Johns Hopkins All Children's Research and Education Building
	600 5th St S, St. Petersburg, FL 33701
Tel	(727) 767-4499
E-mail	ecrabtr2@jhmi.edu

Education and Training

Undergraduate
2019   B.S., Chemical and Biomolecular Engineering, The University of Alabama, Tuscaloosa, AL

Doctoral/graduate
2024   M.S., Applied Mathematics and Statistics, Johns Hopkins University, Baltimore, MD
2024   Ph.D., Chemical and Biomolecular Engineering, Johns Hopkins University, Baltimore, MD

Postdoctoral
2024-2025   NASA Postdoctoral Program Fellow, NASA Marshall Space Flight Center, Huntsville, AL

Professional Experience
2014-2019   Research Assistant, Department of Chemical Engineering, The University of Alabama, Tuscaloosa, AL

2016-2017   Process Engineering Co-op, Georgia-Pacific LLC, Pennington, AL

2022-2023   Visiting Scientist, Sandia National Labs, Livermore, CA

PUBLICATIONS

Original Research [OR]

1.   Abedini A, **Crabtree E**, Bara JE, Turner CH. Molecular simulation of ionic polyimides and composites with ionic liquids as gas-separation membranes. Langmuir. 2017; 33(42): 11377-11389.
2.   Abedini A, **Crabtree E**, Bara JE, Turner CH. Molecular analysis of selective gas adsorption within composites of ionic polyimides and ionic liquids as gas separation membranes. Chemical Physics. 2019; 516: 71-83.
3.   Szala-Bilnik J, Abedini A, **Crabtree E**, Bara JE, Turner CH. Molecular transport behavior of CO2 in ionic polyimides and ionic liquid composite membrane materials. The Journal of Physical Chemistry. 2019; 123(34): 7455-7463.
4.   Szala-Bilnik J, Abedini A, **Crabtree E**, Bara JE, Turner CH. Solubility and diffusivity of CO2 in ionic polyimides with [C (CN) 3] x [oAc] 1− x anion composition. Computational Materials Science. 2020; 174: 109648.
5.   **Crabtree ER**, Bello-Rivas JM, Ferguson AL, Kevrekidis IG. GANs and closures: Micro-macro consistency in multiscale modeling. Multiscale Modeling & Simulation. 2023; 21(3): 1122-1146.
6.   **Crabtree ER**, Bello-Rivas JM, Kevrekidis IG. Micro-macro consistency in multiscale modeling: Score-based model assisted sampling of fast/slow dynamical systems. Chaos. 2024; 34(5): 053110.

7.   Abu-Mualla M, **Crabtree E**, Michael F, Pan Y, Huang J. Inverse Design of Alloys via Generative Algorithms: Optimization and Diffusion within Learned Latent Space. Advanced Intelligent Discovery. 2025; 202500069.
8.   Giovanis DG, **Crabtree E**, Ghanem RG, Kevrekidis IG. Generative learning of densities on manifolds. Computer Methods in Applied Mechanics and Engineering. 2025; 446: 118226.

Review Articles [RA]   None
Case Reports [CR]   None
Book Chapters, Monographs [BC]   None
Books, Textbooks [BK]   None
Editorials [ED]   None
Guidelines/Protocols, Consensus Statement, Expert Opinion, Consortium Articles [GL]   None
Letters, Correspondence [LT]   None

Other Publications
Original Research, other (not peer reviewed and/or not indexed, preprints) [RO]
1.   **Crabtree ER**, Giovanis DG, Evangelou N, Bello-Rivas JM, Kevrekidis IG. Generative learning for slow manifolds and bifurcation diagrams. arXiv preprint. 2025; arXiv:2504.20375.

FUNDING   None

CLINICAL ACTIVITIES   None

EDUCATIONAL ACTIVITIES
Educational Focus
My educational focus is incorporating novel computational and data science methods into existing curriculum for applied mathematics, chemical/biomolecular engineering, and clinical applications. My established experience is in taking a computational approach to chemical reactor design, helping students think of complex reactors as generic dynamical systems and simulating them through computational methods. For my efforts, I was awarded a departmental honor for my teaching at Johns Hopkins University's department of chemical and biomolecular engineering.

Teaching and Facilitating Learning
Classroom Instruction
Local institution/ JHMI/Regional
2021   Teaching Assistant/Lecturer, Kinetic Processes, Johns Hopkins University, Baltimore, MD 80 students

2022   Teaching Assistant/Lecturer, Kinetic Processes, Johns Hopkins University, Baltimore, MD, 80 students
National   None
International   None

Clinical Instruction   None
CME Instruction   None
Workshops/ Seminars   None
Mentoring, coaching, and advising   None

RESEARCH ACTIVITIES
Research Focus
My primary research aim is to computationally model biological systems through the use of both physics-based and data-driven methods. My previous research involved the modeling of small molecules and biologics as well as modeling physical phenomena in outer space environments. Currently, I focus on the development of digital twin technologies for clinical applications. Specifically, I am interested in developing machine learning models to be used in tandem with existing real-time data collection technologies for the purpose of improving children's health.

Research Program Building / Leadership   None
Research Demonstration Activities   None
Inventions, Patents, Copyrights   None
Technology Transfer Activities   None

SYSTEM INNOVATION AND QUALITY IMPROVEMENT ACTIVITIES   None

ORGANIZATIONAL ACTIVITIES
Institutional Administrative Appointments   None
Editorial Activities
Editorial Board Appointments   None
Journal Peer Review Activities   None
Other Peer Review Activities   None
Advisory Committees, Review Groups/Study Sections   None

Professional Societies
2014-Present   Member, American Institute of Chemical Engineers (AIChE)
2014-Present   Member, American Chemical Society (ACS)
2020-Present   Member, Society of Industrial and Applied Mathematics (SIAM)

Conference Organizer   None
Session Chair   None
Consultantships   None

RECOGNITION
Awards, Honors
2014-2019   Dean's List, University of Alabama
2018   Omega Chi Epsilon, National Chemical Engineering Honor Society
2018   Gamma Sigma Epsilon, National Chemistry Honor Society
2019   Randall Outstanding Undergraduate Research Award, University of Alabama
2022   Chemical and Biomolecular Engineering Teaching Assistant Award, Johns Hopkins University
2022   SCGSR Fellowship, US Department of Energy

Invited Talks   None
Visiting Professorships   None

OTHER PROFESSIONAL ACCOMPLISHMENTS
Posters
05/14   **Crabtree E**. Physical Representations of Molecular Simulations. University of Alabama Undergraduate Research Conference. Tuscaloosa, AL
10/30/17   Abedini A, Turner CH, Bara JE, **Crabtree E**. Molecular Simulation of Ionic Polyimides and Ionic Liquid Composites for Gas Separation. AIChE Annual Meeting. Minneapolis, MN.

Oral/Podium Presentations
10/30/17   Turner CH, Abedini A, **Crabtree E**, Bara JE. Gas Adsorption Behavior in Ionic Polyimide Composite Membranes. AIChE Annual Meeting. Minneapolis, MN.
10/28/18   Abedini A, Szala-Bilnik J, **Crabtree E**, Bara JE, Turner CH. Molecular Simulation of Ionic Polyimides and Ionic Liquid Composite Membranes for Gas Selectivity and Adsorption. AIChE Annual Meeting. Pittsburgh, PA.
11/9/21   **Crabtree E**, Bello-Rivas JM, Ferguson AL, Kevrekidis IG. Something Old, Something New: Generative Adversarial Approaches to Conditional Sampling in Complex System Simulations. AIChE Annual Meeting. Boston, MA.
11/17/21   Evangelou N, Wichrowski N, **Crabtree E**, Dietrich F, Bello-Rivas J, Yeh A, Zhang J, Bevan MA, Kevrekidis IG. From Brownian Dynamics Simulations and Experimental Observations of Colloidal Suspensions to Data-Driven Observables and Effective SDEs with Manifold Learning. AIChE Annual Meeting. Boston, MA. *[Dr. Evangelou gave the talk]*
5/15/23   **Crabtree ER**, Bello-Rivas JM, Ferguson AL, Kevrekidis IG. Generative Model Assisted Sampling of Multiscale Dynamical Systems. 2023 SIAM Conference on Dynamical Systems. Portland, OR.
11/7/23   **Crabtree ER**, Bello-Rivas JM, Ferguson AL, Kevrekidis IG. Generative Model Assisted Sampling of Multiscale Dynamical Systems. AIChE Annual Meeting. Orlando, FL.

10/14/24   Sowards JW, **Crabtree E**, O'Connor A, Protz CS. Computational and physics-based modeling for the development of in-space welding technology. AWS 2024. Orlando, FL. October 14, 2024. *[Dr. Sowards gave the talk]*

12/2/24   O'Connor A, Bonebrake JM, Bryan TC, Courtright ZS, Cowen CT, **Crabtree ER**, Evans WC, Fripp N, Ivester JC, Jaynes EK, Littles LS, Protz CS, Rupp BS, Sowards JS. A Combined Computational, Experimental, and Technology Development Approach to In-Space Laser Manufacturing Maturation at NASA Marshall Space Flight Center. Defense Manufacturing Conference. December 2, 2024. *[Dr. O'Connor gave the talk]*

1/6/25   O'Connor A, Bonebrake JM, Bryan TC, Courtright ZS, Cowen CT, **Crabtree ER**, Evans WC, Jaynes EK, Ivester JC, Littles LS, Protz CS, Rupp BS, Shake PD, Subedi R, Sowards JS. Establishing An In-Space Joining Ecosystem at NASA Marshall Space Flight Center via Laser Beam Welding. AIAA Scitech 2025 Forum. Orlando, FL. *[Dr. O'Connor gave the talk]*

6/17/25   **Crabtree ER**, O'Connor A, Michael F, Littles L, Sowards J. ICME Tools for in-Space Welding. 8th World Congress on Integrated Computational Materials Engineering. Anaheim CA.