Hassan H. Abdallah

Curriculum Vitae
Department of Mathematics
Wayne State University
hassan@wayne.edu

Education

Ph.D. in Mathematics (*In Progress*), Wayne State University — August 2021 - Present

M.S. Student in Biostatistics, University of Michigan, Ann Arbor — August 2020 - May 2021

M.A. in Applied Mathematics, Wayne State University — May 2020

B.S. in Mathematics, Wayne State University — May 2017

Selected Employment

Ph.D. Research Intern — May 2025 - August 2025
Oak Ridge National Laboratory, Computational Sciences and Engineering Division

National Science Foundation RTG Graduate Fellow — August 2023 - Present
National Science Foundation

Graduate Teaching Assistant — August 2021 - May 2023
Wayne State University, Department of Mathematics

Ph.D. Intern — May 2022 - August 2022
Lawrence Livermore National Laboratory, Machine Intelligence Group

Senior Systems Software Engineer — January 2018 - August 2021
Wayne State University, High Performance Computing

Papers

In Preparation:

1. **H. Abdallah**, A. Salch, J. Kopchick, V. Diwadkar. *A mathematical framework for recovering functional properties in brain networks.* (2025)

Peer-Reviewed:

1. **H. Abdallah**, A. Regalski, M. Kang, M. Berishaj, N. Nandi, A. Chowdury, V. Diwadkar, A. Salch. *Statistical Inference for Persistent Homology applied to simulated fMRI time series data.* (2023) Foundations of Data Science https://doi.org/10.3934/fods.2022014
2. A. Salch, A. Regalski, **H. Abdallah**, R. Suryadevara, M. Catanzaro, V. Diwadkar. *From Mathematics to Medicine: A practical primer on topological data analysis (TDA) and the development of related analytic tools for the functional discovery of latent structure in fMRI data* (2021) PLOS One https://doi.org/10.1371/journal.pone.0255859
3. **H. Abdallah**, A. Liyanaarachchi, M. Saigh, S. Silvers, S. Arslanturk, D. Taatjes, L. Larsson, B. Jena, D. Gatti. *Res-CR-Net, a residual network with a novel architecture optimized*

for the semantic segmentation of microscopy images. (2020) Machine Learning: Science and Technology https://doi.org/10.1088/2632-2153/aba8e8

Preprints:

4. **H. Abdallah**, Z. Halladay, Y. Kamel. *On the nonexistence of a Green functor with values $MSpin^c$ and MSpin* (2025) Preprint.
5. **H. Abdallah**, A. Salch. *Products in spin^c-cobordism* (2024) Preprint.
6. R. Bremseth-Vining, V. Borda, D. Craig, J. Ruterbusch, J. Boerner, J. Fucinari, R. Ali-Fehmi, M. Elshaikh, **H. Abdallah**, G. L. Maxwell, K. M. Darcy, G. Dyson, T. Conrads, N. W. Bateman, M. L. Cote, T. D. O'Connor. *The relationships between genetic ancestry, somatic mutation frequency, and histologic subtypes in high-grade endometrial cancer* (2023) Preprint.
7. H. Abdulah, B. Huber, **H. Abdallah**, L. Palese, H. Soltanian-Zadeh, D. Gatti. *A Hybrid Pipeline for Covid-19 Screening Incorporating Lungs Segmentation and Wavelet Based Preprocessing of Chest X-Rays* (2022) Preprint.
8. H. Abdulah, B. Huber, S. Lal, **H. Abdallah**, L. Palese, H. Soltanian-Zadeh, D. Gatti. *CXR-Net: An Artificial Intelligence Pipeline for Quick Covid-19 Screening of Chest X-Rays* (2021) Preprint.
9. H. Abdulah, B. Huber, S. Lal, **H. Abdallah**, H. Soltanian-Zadeh, D. Gatti. *Lung Segmentation in Chest X-rays with Res-CR-Net* (2020) Preprint.

Talks

Invited:

- *Some Fivebrane Bordism Groups at the Prime 2*, Topology Seminar, University of South Florida, March 2025
- *Stable Homotopy Theory and Cobordism*, Mathematics Colloquium, University of South Florida, March 2025
- *Graph Sensitivity of High Dimensional Morse Complexes*, Topological Data Analysis Seminar, Michigan State University, November 2022
- *Statistical Approaches to Topological Data Analysis applied to functional Magnetic Resonance Imaging (fMRI)*, Advanced Computing for Health Sciences Seminar, Oak Ridge National Laboratory, December 2021
- *Topological Data Analysis of Time Series Data: Methods and Applications*, Student Math & Applications Seminar, Wayne State University, Detroit, MI, September 2019

Contributed:

- *Some Calculations of the Spin^c Cobordism Ring*, Midwest Topology Seminar, Champaign, Illinois, September 2023
- *Identification of vascular substructures with Topological Data Analysis*, San Diego Supercomputing Summer Institute, San Diego, CA, August 2018

Poster Presentations

- **H. Abdallah**, A. Salch, J. Kopchick, V. Diwadkar. *A novel mathematical construction for identifying attractors from task-driven fMRI data* Organization For Human Brain Mapping Annual Meeting, Seoul, Korea, June 2024
- **H. Abdallah**, S. Liu, I. Kim, P.T. Bremer. *Morse Complex Dynamics over Filtered Graphs.* Young Topologist's Meeting, École polytechnique fédérale de Lausanne (EPFL), Lausanne, Switzerland, July 2023.

- **H. Abdallah**, A. Regalski, M. Kang, M. Berishaj, N. Nandi, A. Chowdury, V. Diwadkar, A. Salch. *Statistical Inference for Persistent Homology applied to simulated fMRI time series data.* Algebraic Topology: Methods, Computation, & Science, Oxford University, UK, June 2022.
- M. Cote, G. Dyson, D. Craig, J. Ruterbusch, J. Boerner, M. Elshaikh, T. Conrads, N. Bateman, G. Maxwell, K. Darcy, S. Makohon-Moores, T. O'Connor, **H. Abdallah**, L. Corey, M. Kheil, R. Ali-Fehmi. *Whole exome sequencing of uterine serous carcinomas reveals racial differences in known and novel driver mutations.* American Association of Cancer Research Annual Meeting, New Orleans, USA, April 2022.
- **H. Abdallah**, A. Regalski, M. Berishaj, A. Salch. *A Statistical Procedure for Identifying Persistent Vines.* Algebraic Topology: Methods, Computation, & Science, Ohio State University, June 2020 (Postponed due to COVID-19).
- A. Regalski, **H. Abdallah**, M. Berishaj, M. Kang, A. Salch. *Dynamics of topologically-characterized structures within fMRI signal.* Organization for Human Brain Mapping Annual Meeting, Montreal, Canada, July 2020 (Withdrew due to COVID-19).
- **H. Abdallah**, A. Regalski, M. Berishaj, M. Kang, A. Salch. *Statistical inference from persistent homology of fMRI signals.* Organization for Human Brain Mapping Annual Meeting, Montreal, Canada, July 2020(Withdrew due to COVID-19).

Awards and Grants

- Rumble Fellowship, Department of Mathematics, Wayne State University, 2025-2026
- The M.F. Janowitz Award, Department of Mathematics, Wayne State University, 2025-2026
- Outstanding Graduate Student, Department of Mathematics, Wayne State University, 2024
- NSF electronic Computational Homotopy Theory (eCHT) RTG Graduate Fellowship 2023-2024, 2024-2025
- William Martin Borgman Endowed Scholarship in Mathematics, Department of Mathematics, Wayne State University, 2023-2024, 2024-2025
- University of Michigan School of Public Health Tuition Scholarship, Department of Biostatistics, University of Michigan, Ann Arbor, 2020 - 2021.
- Robert and Nancy Irvan Endowed Scholarship, In recognition of academic excellence in Master's program. Department of Mathematics, Wayne State University, 2020
- National Science Foundation Travel Grant, $2500. Funding to attend Summer Conference on Topology and its Applications. Johannesburg South Africa, July 2020.
- National Science Foundation Travel Grant, $400. Funding to attend Graduate Student Topology and Geometry Conference. Champaign IL, March 2019.

Teaching

- MAT 2030 (Calculus III), Summer 2024, Wayne State University, *Primary Instructor*
- eCHT Stable Homotopy Theory Course, Winter 2024, *Teaching Assistant*
- eCHT Kan Seminar, Fall 2023, Fall 2024, Winter 2025 *Teaching Assistant*
- MAT 2020 (Calculus II), Summer 2023, Wayne State University, *Primary Instructor*
- MAT 2030 (Calculus III), Fall 2022, Wayne State University, *Primary Instructor*

- MAT 2020 (Calculus II), Winter 2022, Wayne State University, *Primary Instructor*

Service

- Co-Organizer, eCHT Research Seminar Reading Group, Fall 2023, Winter 2024
- Graduate Assistant, eCHT Research Seminar, Fall 2023, Winter 2024, Fall 2024
- Co-organizer, Graduate Seminar on Lurie's Higher Algebra, Winter 2023
- Co-organizer, Graduate Seminar on ∞-Categories, Fall 2021