

Hassan Abdallah
Curriculum Vitae
Department of Mathematics
Wayne State University
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Education

Ph.D. in Mathematics (<i>In Progress</i>), 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

National Science Foundation RTG Graduate Fellow National Science Foundation	August 2023 - Present
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Graduate Teaching Assistant Wayne State University, Department of Mathematics	August 2021 - May 2023
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Ph.D. Intern Lawrence Livermore National Laboratory, Machine Intelligence Group	May 2022 - August 2022
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Senior Systems Software Engineer Wayne State University, High Performance Computing	January 2018 - August 2021
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Papers

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**, A. Salch. *Products in spin^c-cobordism* (2024) Preprint.
5. 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 Pre-processing of Chest X-Rays (2022) [Preprint](#).

6. 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](#).
7. 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:

- *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

Tutorials:

- *Introduction to Topological Data Analysis with R in HPC*, Topological Data Analysis course, Wayne State University, Detroit MI, March 2019
- *Fundamentals of High Performance Computing*, Wayne State University, Detroit MI, September 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. Bate-man, G. Maxwell, K. Darcy, S. Makohon-Moore, 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

- 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.

Technical Skills

Computing Tools

Linux, OpenMP, MPI, PBS, Slurm.

Computer Languages

Extensive experience with R, bash, Python, C++, and L^AT_EX. Some experience with SQL.

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, *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
- Co-organizer, Graduate Seminar on Lurie's Higher Algebra, Winter 2023
- Co-organizer, Graduate Seminar on ∞ -Categories, Fall 2021