Moffitt Cancer Center
Integrated Mathematical Oncology
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Kayode Olumoyin

EDUCATION

- **Ph.D.** Computational Science
  Middle Tennessee State University, Murfreesboro, TN, 2022
  Dissertation Topic: Data-driven deep neural networks for epidemiological and biochemical models
  Advisor: Dr. Abdul Q. M. Khaliq
- **M.A.** Computational and Applied Mathematics
  Bowling Green State University, Bowling Green, OH, 2016
  Advisor: Dr. So-Hsiang Chou
- **M.A.** Mathematics
  Marshall University, Huntington, WV, 2013
  Dissertation Topic: Solutions of dynamic equations on time scales with jumps
  Advisor: Dr. Bonita Lawrence
- **B.S.** Mathematics
  University of Agriculture, Abeokuta, Nigeria, 2009

RESEARCH INTEREST

- Mathematical Oncology, Machine Learning, Deep Learning, Agent Based Modeling, Infectious Disease Modeling, Ordinary and Partial Differential Equations, PDE based Fractional Differential Equations, Numerical Partial Differential Equations.

EXPERIENCE

- **Applied Postdoctoral Fellow**, Moffitt Cancer Center, Tampa, FL — 2022 – present
  Project: Development of Adoptive T-cell Bladder Cancer Incorporating Patient-Specific tumor Microenvironment
  Advisor: Dr. Kasia Rejniak
- **Adjunct Faculty**, Middle Tennessee State University — 2021 – 2022
  Mathematics Department
- **Adjunct Faculty**, Middle Tennessee State University — Summer 2019
  University Studies Department
- **Lecturer**, Middle Tennessee State University — 2016 – 2019
  University Studies Department
- **Graduate Teaching Assistant**, Bowling Green State University — 2013 – 2016
  Mathematics Department
- **Graduate Teaching Assistant**, Marshall University — 2011 – 2013
  Mathematics Department

PUBLICATIONS

REFEREED

- **Olumoyin, K.D.**, Aydin, A.M., Bazargan, S., Bunch, B.L., Pilon-Thomas, S., Poch, M., Rejniak, K.A. A Machine Learning Protocol for Predicting Expansion of Tumor Infiltrating Lymphocytes in Patients' Bladder Tumors, (in preparation).
- Hu, A., Ojwang, A.M.E, **Olumoyin, K.D.**, Rejniak, K.A. LinG3D: Visualizing the Spatio-Temporal Dynamics of Clonal Evolution, (under review), BMC Bioinformatics.
- **Olumoyin, K.D.**, Khaliq, A.Q.M., Furati, K.M. Data-driven deep learning algorithm for Asymptomatic COVID-19 model with varying mitigation measures and transmission rate. *Epidemiologia* **2021**, 2, 471 – 489. https://doi.org/10.3390/epidemiologia2040033

PREPRINTS

- **Olumoyin, K.D.**, Khaliq, A.Q.M., Furati, K.M. Multi-variant COVID-19 model with heterogeneous transmission rates using deep neural networks. *arXiv:2205.06834v1* **2022**. https://doi.org/10.48550/arXiv.2205.06834
- **Olumoyin, K.D.** Learning differential equations from data. *arXiv:2205.11483v1* **2022**. https://doi.org/10.48550/arXiv.2205.11483
- **Olumoyin, K.D.**, Khaliq, A.Q.M., Furati, K.M. Data-driven deep learning algorithms for time-varying infection rates of COVID-19 and mitigation measures. *arXiv:2104.02603v3* **2021**. https://doi.org/10.48550/arXiv.2104.02603

CONFERENCE ABSTRACTS

- Lawrence, B.A., **Olumoyin, K.D.**, Peterson, M.K. Solutions of dynamic equations on a sequence of converging time scales. AMS Fall Central Sectional Meeting, Washington University, St. Louis, Missouri, **October 18 – 20, 2013**. http://www.ams.org/meetings/sectional/2204_program_saturday.html

AWARDS

- **MATHONC23:** Travel award to attend the inaugural Mathematical Oncology meeting, Phoenix, Arizona, April 30 – May 3, 2023
- **CBAS Graduate Research Showcase:** Best presentation award, Middle Tennessee State University, February 5, 2021
- **SIAM MDS20:** Student travel award, Cincinnati, Ohio, May 5 – 7, 2020
- **Winifred O. Stone Presidential Graduate Scholarship Award for Diversity Enhancement:** Bowling Green State University, 2013 & 2014
- **National Mathematics Competition for University Students (NAMCUS):** First Position (Team), National Mathematical Center (NMC), Abuja, Nigeria, 2008
- **National Mathematics Competition for University Students (NAMCUS):** Silver Medalist (Individual), National Mathematical Center (NMC), Abuja, Nigeria, 2008

CONFERENCE SESSION ORGANIZED

Minisymposium

- Advances in computational modeling of novel tumor treatments, 2024 SIAM Conference on the Life Sciences

CONFERENCE PRESENTATIONS

- *A Machine Learning Protocol for Predicting Expansion of Tumor Infiltrating Lymphocytes in Patients' Bladder Tumors.* 17th U.S. National Congress on Computational Mechanics, (USNCCM17), Albuquerque, New Mexico, **July 23 – July 27, 2023.**
- *ML-PETIL: A Machine Learning Predictor of the Expansion of Tumor Infiltrating Lymphocytes in Patients' Bladder Tumors.* Inaugural Mathematical Oncology meeting, Spring 2023 (MATHONC23), Phoenix, Arizona, **April 30 – May 4, 2023.**
- *Mathematical Modeling of Adoptive Immunotherapy in B16 Melanoma: A Physics-Informed Machine Learning Approach.* Mathematics and Statistics Department Colloquium, Bowling Green State University, Bowling Green, Ohio, event held Virtually, **November 4, 2022.**
- *Physics-informed Attention Neural Network: Learning the dynamics of Partial Differential Systems with an attention-based model.* **Lightening talk** at Holistic Design of Time-Dependent PDE Discretizations, Topical Workshop held at ICERM, Providence, Rhode Island, **January 10 – 15, 2022.**
- *Data-driven deep learning algorithms for COVID-19 time-varying infection rates and mitigation measures.* mini-symposium at SIAM Conference on Computational Science and Engineering, CSE21, event held Virtually, **March 1 – 5, 2021.**
- *Learning time-varying COVID-19 infection rate from data.* CBAS Graduate Research Showcase, Middle Tennessee State University, Murfreesboro, Tennessee, **February 5, 2021.**
- *PDE Based Neural Network Approach Using Noisy Data in Facial recognition.* SIAM conference on Mathematics of Data Science (MDS20), Cincinnati, Ohio, **May 5 – 7, 2020.**
- *The Marshall−Simpson Differential Analyzer Project: Mechanical Interpretations of Mathematical Equations* (co−presented with Dr. Bonita Lawrence and Molly Peterson), Simpson College, Iowa, **March 18, 2013.** `https://simpsoncollegemath.blogspot.com/`
- *Generalization of First Order Linear Differential and Difference Equations.* 40th Annual Mathematics and Statistics Conference, Miami University, Oxford, Ohio, **September, 2012.**

POSTER PRESENTATIONS

- *An Early Determination of Patients Eligibility using a Data Science Approach*, 2023 AACR Special Conference: Translating Cancer Evolution and Data Science: The Next Frontier, Boston, Massachusetts, **December 03 – 06, 2023.**
- *A Machine Learning Protocol for Predicting Expansion of Tumor Infiltrating Lymphocytes in Patients' Bladder Tumors*, Moffitt Quantitative Science Octoberfest, **October 23, 2023.**
- *ML-PETIL: A Machine Learning Predictor of the Expansion of Tumor Infiltrating Lymphocytes in Patients' Bladder Tumors*, 13th Annual Moffitt Scientific Symposium, **May 16 – 17, 2023.**
- *Physics-informed Attention Neural Network: Learning the dynamics of Partial Differential Systems with an attention-based model*, CBAS Scholars Week 2022, **March 22, 2022.**
- *Data-driven deep learning algorithm for Asymptomatic COVID-19 model with time-varying transmission rate*, Modeling in a Heterogeneous World, XVIII Red Raider Mini-symposium, held at Texas Tech University, Lubbock, Texas, **August 20 – 21, 2021.**

WORKSHOPS

- **IMO 11: Steering Evolution/Extinction**
  Integrated Mathematical Oncology (IMO) Workshop, Moffitt Cancer Center, October 29 – November 3, 2023.
  I was a member of the winning team - Purple team, that won a $\$50000$ grant.
  Project title: Steering Cancer Extinction in Metastatic Breast Cancer Using an Integrative Toxicity Metric.
  Task: I contributed a deep learning based toxicity index prediction code using temporal tumor burden, lab tests and patient reported outcome data.
- **IMOX: Cancer Communities**
  Integrated Mathematical Oncology (IMO) Workshop, Moffitt Cancer Center, October 31 – November 4, 2022.
  I was a member of the Blue team.
  Project title: Cancer Cachexia: No time to waste.
  Task: Team member - Camara Casson and I built a model that predicts cachexia from Non-Small Cell Lung Cancer (NSCLC) patients' data. I was one of three podium presenters for the Blue team.

CONFERENCE ATTENDED

- *Cancer AI Research: Computational Approaches Addressing Imperfect Data.* National Cancer Institute, **April 03 – 04, 2023.**, (Virtual attendance)
- *Digital Twins in Biomedical Sciences Workshop.* National Academies, **January 30, 2023.**, (Virtual attendance)
- *SIAM Conference on Mathematics of Data Science (MDS22).* San Diego, California, **September 26 – 30, 2022.**, (Virtual attendance)
- MANNA (Modeling, Analysis and Numerics for Nonlocal Applications), Santa Fe, New Mexico, **December 11 – 15, 2017.**
- Informal Analysis Seminar, Kent State University, Ohio, **April 11 – 13, 2014.**
- 96th Annual Meeting of the Mathematical Association of America, Ohio Section, Spring 2012, Xavier University, Cincinnati, Ohio, **April, 2012.**
- The 31st Southeastern-Atlantic Regional Conference on Differential Equations, Georgia Southern University, Georgia, **September, 2011.**

PROFESSIONAL MEMBERSHIP

- Society for Industrial and Applied Mathematics (Early Career Member)
- Society for Mathematical Biology (Standard Member)
- Pi Mu Epsilon (West Virginia beta)

SKILLS

- Python, TensorFlow, Keras, PyTorch, R, Julia, C, Matlab, Mathematica, Linux, MPI

STUDENT MENTORING AND OUTREACH

- **High School Internship Program - Integrated Mathematical Oncology (HIP-IMO)**
  - **Risheet Jajoo**, Student Intern, Moffitt Cancer Center, Tampa, FL, **June 5, 2023 – July 28, 2023.**

    Project Topic: A Genetic Algorithm based Manifold Learning Feature Selection Approach using Bladder Cancer Patients Data
- **Great American Teach-In (GATI)** Sand Pine Elementary School, Pasco County Schools, FL, **November 15, 2023**

  Task: I gave a talk to kindergarteners titled "Mathematics can improve Cancer outcomes"
- **Student Athletics Enhancement Center (SAEC)** Middle Tennessee State University, Murfreesboro, TN, **Fall, 2019 – Spring, 2020.**

  Task: I tutored and mentored student athletes
- **National Youth Service Corp (NYSC)**, Briyel, Bayo LGA, Borno State, Nigeria, **2009 – 2010.**

  Task: NYSC is a national volunteer program in Nigeria for recent university graduates. I was posted to a low income community, where I taught Mathematics in a junior high school for 4 months. I was reassigned to an elementary school and I was appointed headmaster for the remainder of the program.