# Kayode Olumoyin

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**EDUCATION**:

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

**RESEARCH INTEREST**:

- Mathematical Oncology, Machine Learning, Deep Learning, Agent Based Modeling, Infectious Disease Modeling, Fractional Differential Equations Modeling, Dynamic Equations on Time Scales.

**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. Katarzyna Rejniak*
- **Adjunct Faculty**, Mathematics Department, Middle Tennessee State University 2021 – 2022
- **Adjunct Faculty**, University Studies Department, Middle Tennessee State University Summer 2019
- **Lecturer**, University Studies Department, Middle Tennessee State University 2016 – 2019
- **Graduate Teaching Assistant**, Mathematics Department, Bowling Green State University 2013 – 2016
- **Graduate Teaching Assistant**, Mathematics Department, Marshall University 2011 – 2013

**AWARDS**:

- **Travel award to attend the inaugural Mathematical Oncology meeting (MATHONC23)** Phoenix, AZ, April 30 – May 3, 2023
- **Best presentation award at the College of Basic and Applied Sciences (CBAS) Graduate Research Showcase**, Middle Tennessee State University, TN, February 5, 2021
- **Student travel award to attend SIAM Conference on Mathematics of Data Science (MDS20):** Cincinnati, OH, May 5 – 7, 2020
- **Graduate School Tuition Scholarship and Graduate Teaching Assistantship:** Funded by the Graduate School and Mathematics Department, Bowling Green State University, OH, August 2015 – May 2016
- **Winifred O. Stone Presidential Graduate Scholarship Award for Diversity Enhancement, Graduate School Tuition Scholarship, and Fellowship:** Bowling Green State University, OH, August 2013 – May 2015

- **Graduate School Tuition Scholarship and Graduate Teaching Assistantship:** Funded by the Graduate School and Mathematics Department, Marshall University, WV, August 2011 – May 2013
- **National Mathematics Competition for University Students (NAMCUS):** National Mathematical Center (NMC), Abuja, Nigeria, November 2008
  **Team ranking – First Prize Winner** (Federal University of Agriculture, Abeokuta)
  **Individual ranking – Second Prize Winner** (Federal University of Agriculture, Abeokuta)

**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**
  - Hu, A, Ojwang, A.M.E., **Olumoyin, K.D.**, Rejniak, K.A. Visualizing the Spatio-Temporal Dynamics of Clonal Evolution with LinG3D software. **BioRxiv 2024**. https://doi.org/10.1101/2024.03.05.583631
  - **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**
  - **Olumoyin, K.D.**, From COVID-19 to Melanoma: Modeling time-varying treatment response using an Epidemiology-informed Neural Network. SMB MathEpiOnco 2024, **February 18 – 20, 2024**. https://seminar.math.vt.edu/SMB-MEPI-ONCO/SMB-MEO-Abstracts.pdf
  - **Olumoyin, K.D.**, Aydin, A.M., Bunch, B.L., Pilon-Thomas, S., Poch, M., Rejniak, K.A., An early determination of patients eligibility for a bladder cancer immunotherapy using a data science approach. In Proceedings of AACR Special Conference in Cancer Research: Translating Cancer Evolution and Data Science: The Next Frontier, Boston, Massachusetts, **December 3 – 6, 2023**. AACR; Cancer Res **(2024)**; 84(3 suppl 2): A020. https://doi.org/10.1158/1538-7445.CANEVOL23-A020
  - 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

**CONFERENCE SESSION ORGANIZED**:

- **MINISYMPOSIUM**
  - **MS65: Advances in computational modeling of novel tumor treatments**, SIAM Conference on the Life Sciences (LS24), Portland, Oregon, **June 10 – 13, 2024.** https://meetings.siam.org/sess/dsp_programsess.cfm?SESSIONCODE=79243

**CONFERENCE PRESENTATIONS**:

- *A Predictive Tool for the Expansion of Tumor Infiltrating Lymphocytes in Patients' Bladder Tumor.* SIAM Conference on the Life Sciences (LS24), Portland, Oregon, **June 10 – 13, 2024.**
- *From COVID-19 to Melanoma: Modeling time-varying treatment response using an Epidemiology-informed Neural Network.* Joint meeting between the Mathematical Epidemiology and Mathematical Oncology Subgroups of the Society of Mathematical Biology, (SMB MathEpiOnco 2024), event held Virtually, **February 18 – 20, 2024.**
- *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.* ***member of the Purple team (won first place and 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.* ***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 PARTICIPATION**:

- *Systems Biology: Foundations for Interdisciplinary Careers.* Center for Complex Biological Systems, University of California, Irvine, **February 20 – March 01, 2024.**
- *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**:

- American Association for Cancer Research (AACR), Associate Member, 2024 – present
- Society for Industrial and Applied Mathematics (SIAM), Early Career Member, 2014 – present
- Society for Mathematical Biology (SMB), Standard Member, 2022 – present

- U.S. Association for Computational Mechanics (USACM), Member, 2023 – present
- Pi Mu Epsilon (West Virginia beta), Member, 2012 – present

**PROGRAMMING SKILLS**:

- **Machine Learning** – Python (PyTorch, TensorFlow, Keras, Scikit-Learn), Julia
- **Computational Mathematics** – Matlab, Mathematica
- **Statistics** – R
- **other programming languages** – C, C++

**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."*
- Tutored and mentored student athletes for the **Student Athletics Enhancement Center (SAEC)** Middle Tennessee State University, Murfreesboro, TN, **Fall, 2019 – Spring, 2020.**
- Volunteered in the national program for recent university graduates in Nigeria **National Youth Service Corp (NYSC)** in Bayo LGA, Borno State, Nigeria
  - I taught Mathematics in a junior high school, **August 2009 – December 2009.**
  - I was reassigned to an elementary school as headmaster **December 2009 – July 2010.**