

# Kayode Olumoyin

Moffitt Cancer Center – Integrated Mathematical Oncology – Tampa, FL 33612

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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

## PUBLICATIONS:

### ○ REFEREED

1. **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).
2. 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.
3. **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

1. 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>.

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2. **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>
3. **Olumoyin, K.D.** Learning differential equations from data. *arXiv:2205.11483v1* **2022**. <https://doi.org/10.48550/arXiv.2205.11483>
4. **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

1. **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>
2. **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>
3. 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](http://www.ams.org/meetings/sectional/2204_program_saturday.html)

#### GRANTS:

##### ○ PI/Co-PI: Moffitt (PI: Olumoyin, co-PI: Rejniak)

*Dates: 06/01/2024-05/31/2025*

*Source: Miles for Moffitt Team Science Funding Opportunity for Postdoctoral and Applied Postdoctoral Fellows*

*Title: "Predicting Cancer Cachexia in Pancreatic Ductal Adenocarcinoma Patients"*

*Role in the Study: PI*

*Total Amount of Award: \$25,000*

#### AWARDS:

##### ○ TRAVEL AWARDS

- **Travel award to attend the inaugural Mathematical Oncology meeting (MATHONC23)**, Phoenix, AZ, April 30 – May 3, 2023, (\$750).
- **Student travel award to attend SIAM Conference on Mathematics of Data Science (MDS20)**: Cincinnati, OH, May 5 – 7, 2020, (Conference held virtually due to the COVID pandemic).

##### ○ GRADUATE FELLOWSHIP AND TEACHING ASSISTANTSHIP

- **Graduate Teaching Assistantship**, Mathematics Department, Bowling Green State University, OH, August 2013 – May 2016, (\$23,286).
- **Winifred O. Stone Presidential Graduate Fellowship Award for Diversity Enhancement**, Bowling Green State University, OH, August 2013 – May 2015, (\$33,000).
- **Graduate Teaching Assistantship**, Mathematics Department, Marshall University, WV, August 2011 – May 2013, (\$18,000).

##### ○ Best presentation award at the College of Basic and Applied Sciences (CBAS) Graduate Research

Showcase, Middle Tennessee State University, TN, February 5, 2021.

- **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)

**CONFERENCE SESSION ORGANIZED:**

- **MINISYMPOSIUM**

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

**CONFERENCE PRESENTATIONS:**

1. *A Predictive Tool for the Expansion of Tumor Infiltrating Lymphocytes in Patients' Bladder Tumor*. SIAM Conference on the Life Sciences (LS24), Portland, Oregon, **June 13, 2024**.
2. *An Early Determination of Patients Eligibility for a Bladder Cancer Immunotherapy using a Data Science Approach*, **Oral Presentation, Quantitative Science Category**, 14th Annual Moffitt Scientific Symposium, Moffitt Cancer Center, Tampa, Florida, **May 8, 2024**.
3. *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**.
4. *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**.
5. *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**.
6. *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**.
7. *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**.
8. *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**.
9. *Learning time-varying COVID-19 infection rate from data*. CBAS Graduate Research Showcase, Middle Tennessee State University, Murfreesboro, Tennessee, **February 5, 2021**.
10. *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**.
11. *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/>
12. *Generalization of First Order Linear Differential and Difference Equations*. 40th Annual Mathematics

and Statistics Conference, Miami University, Oxford, Ohio, **September 2012.**

#### **POSTER PRESENTATIONS:**

1. *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.**
2. *A Machine Learning Protocol for Predicting Expansion of Tumor Infiltrating Lymphocytes in Patients' Bladder Tumors*, Moffitt Quantitative Science Octoberfest, Moffitt Cancer Center, Tampa, Florida, **October 23, 2023.**
3. *ML-PETIL: A Machine Learning Predictor of the Expansion of Tumor Infiltrating Lymphocytes in Patients' Bladder Tumors*, 13th Annual Moffitt Scientific Symposium, Moffitt Cancer Center, Tampa, Florida, **May 16 – 17, 2023.**
4. *Physics-informed Attention Neural Network: Learning the dynamics of Partial Differential Systems with an attention-based model*, CBAS Scholars Week 2022, Middle Tennessee State University, Murfreesboro, Tennessee, **March 22, 2022.**
5. *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 \$50,000 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:**

1. *Systemic Effects of Cancer Think Tank*. National Cancer Institute Shady Grove campus **April 16 – 17, 2024.**, (Virtual attendance)
2. *Systems Biology: Foundations for Interdisciplinary Careers*. Center for Complex Biological Systems, University of California, Irvine, **February 20 – March 01, 2024.**
3. *Cancer AI Research: Computational Approaches Addressing Imperfect Data*. National Cancer Institute, **April 03 – 04, 2023.**, (Virtual attendance)
4. *Digital Twins in Biomedical Sciences Workshop*. National Academies, **January 30, 2023.**, (Virtual attendance)
5. *SIAM Conference on Mathematics of Data Science (MDS22)*. San Diego, California, **September 26 – 30, 2022.**, (Virtual attendance)
6. MANNA (Modeling, Analysis and Numerics for Nonlocal Applications), Santa Fe, New Mexico, **December 11 – 15, 2017.**

7. Informal Analysis Seminar, Kent State University, Ohio, **April 11 – 13, 2014.**
8. 96th Annual Meeting of the Mathematical Association of America, Ohio Section, Spring 2012, Xavier University, Cincinnati, Ohio, **April 2012.**
9. 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
- Nigerian Mathematical Society, Member (NMS/2/5942), 2022 – present

**PROGRAMMING SKILLS:**

- **Machine Learning** – Python (PyTorch, TensorFlow, Keras, Scikit-learn, Numpy, Scipy, Pandas, Matplotlib), 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.**