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Applied Postdoctoral Fellow
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EDUCATION

May 2022	Middle Tennessee State University, Murfreesboro, TN Ph.D. in Computational Science, Advisor: Abdul Q. M. Khaliq, Ph.D. Thesis: Data-driven deep neural networks for epidemiological and biochemical models
May 2016	Bowling Green State University, Bowling Green, OH M.A. Computational Mathematics, Advisor: So-Hsiang Chou, Ph.D.
May 2013	Marshall University, Huntington, WV M.A. Mathematics, Advisor: Bonita Lawrence, Ph.D.
January 2009	Federal University of Agriculture, Abeokuta, Nigeria B.Sc. Mathematics

POSITIONS AND APPOINTMENTS

2022–present	Moffitt Cancer Center, Tampa, FL Applied Postdoctoral Fellow Integrated Mathematical Oncology Department (IMO) Advisor: Katarzyna Rejniak, Ph.D.
2016–2022	Middle Tennessee State University, Murfreesboro, TN Adjunct Faculty, Mathematics Department, Fall 2021 - Spring 2022 Student Athletics Enhancement Center (SAEC), Fall 2019 – Spring 2020 Lecturer, University Studies Department, Fall 2016 - Summer 2019

HONORS AND AWARDS

2024	Oral Presentation Award, Moffitt Scientific Symposium.
2023	IMO Workshop: Steering Evolution/Extinction, Member of the First Place Team, awarded a $50,000 grant, I developed a “deep learning–based toxicity index prediction model using temporal tumor burden, lab tests, and patient-reported outcome data”.
2023	Travel Award, Mathematical Oncology Meeting (MATHONCO23).

2021	Best Presentation Award, Graduate Research Showcase, Middle Tennessee State University.
2020	Travel Award, SIAM Conference on Mathematics of Data Science.
2013–2016	Graduate Teaching Assistantship, Bowling Green State University.
2013–2015	Winifred O. Stone Presidential Graduate Fellowship, Bowling Green State University.
2011–2013	Graduate Teaching Assistantship, Marshall University.
2008	First prize, National Mathematics Competition for University Students, Abuja, Nigeria.

GRANT

- Role: PI
  Project/Proposal Title: Predicting Recurrence and Progression Patterns of Patients with Non-Muscle Invasive Bladder Cancer
  Source of Support: Miles for Moffitt Team Science Funding Opportunity for Postdoctoral and Applied Postdoctoral Fellows
  Total Amount Awarded: $25,000
  Total Award Period Covered: 11/01/2025 - 10/31/2026

PUBLICATIONS

Peer-Reviewed Journal Articles and Conference Papers.

1. **Olumoyin, K.D.**, El Naqa, L., Rejniak, K.A. *Learning Model Parameter Dynamics in a Combination Therapy for Bladder Cancer from Sparse Biological Data. NeurIPS **2025** Workshop on Learning from Time Series for Health.* https://openreview.net/forum?id=8j7PSxDB2X.

2. Permuth, J., Park, M., ..., **Olumoyin, K.D.**, ..., Rejniak, K.A., ..., Judge, A. *Race-based differences in serum biomarkers for cancer-associated cachexia in a diverse cohort of patients with pancreatic ductal adenocarcinoma. Commun Med* **(2025)**. https://doi.org/10.1038/s43856-025-01277-9.

3. Hu, A.*, Ojwang', A.M.E.*, **Olumoyin, K.D.***, Rejniak, K.A. *LinG3D: Visualizing the spatio-temporal dynamics of clonal evolution. BMC Bioinformatics* **25**, 201 **(2024)**. https://doi.org/10.1186/s12859-024-05813-7.
   *Equal contribution.

4. **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* **2 (2021)**, 471–489. https://doi.org/10.3390/epidemiologia2040033.

Preprints and Submissions under review.

1. **Olumoyin, K.D.**, Park, M., Davis, E.W., Permuth, J., Rejniak, K.A. *MoCaPS: A Machine Learning Model for Stratification of Cancer-Associated Cachexia Based on Blood Biomarkers.*

medRxiv 2025.12.23.25342866 **(2026)**. https://doi.org/10.64898/2025.12.23.25342866. (**under review: npj Systems Biology and Applications**).

2. **Olumoyin, K.D.**, Aydin, A.M., Bazargan, S., Bunch, B.L., Chamseddine, I., Karolak, A., Beaty, M., Pilon-Thomas, S., Poch, M., Rejniak, K.A. *PETIL: Predicting Expansion of Tumor Infiltrating Lymphocytes for the Adoptive Cell Immunotherapy in Bladder Cancers. bioRxiv* **(2026)**. https://doi.org/10.1101/2025.10.15.682695. (**under review: PLoS Computational Biology**).

3. **Olumoyin, K.D.**, Rejniak, K.A. *Modeling Adoptive Cell Therapy in Bladder Cancer from Sparse Biological Data using PINNs. arXiv:2510.13431* **(2025)**. https://doi.org/10.48550/arXiv.2510.13431

4. **Olumoyin, K.D.**, Park, M., Davis, E.W., Permuth, J., Rejniak, K.A. *Machine Learning-Based Identification of Blood Biomarkers that Distinguish Precachectic and Cachectic Patients with Pancreatic Ductal Adenocarcinoma. medRxiv 2025.12.23.25342866* **(2025)**. https://doi.org/10.64898/2025.12.23.25342866.

5. Permuth, J., Park, M., ..., **Olumoyin, K.D.**, ..., Rejniak, K.A., ..., Judge, A. *Race-based differences in serum biomarkers for cancer-associated cachexia in a diverse cohort of patients with pancreatic ductal adenocarcinoma.* **(2025)**. https://doi.org/10.21203/rs.3.rs-5690506/v1.

6. 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
*Equal contribution.

7. **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

8. **Olumoyin, K.D.** *Learning differential equations from data. arXiv:2205.11483v1* **(2022)**. https://doi.org/10.48550/arXiv.2205.11483

9. **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

PROJECTS at IMO, MOFFITT CANCER CENTER

1. **2022 – 2026**, PETIL: A Machine Learning Predictor of the Expansion of Tumor Infiltrating Lymphocytes in Patients' Bladder Tumors.

2. **2024 – 2026**, MoCaPS: Machine Learning-Based Identification of Blood Biomarkers that Distinguish Precachectic and Cachectic Patients with Pancreatic Ductal Adenocarcinoma.

3. **2025 – 2026**, Optimizing Adoptive Cell Therapy Injection Schedules for Melanoma using a Reinforcement Learning Approach.

4. **2024 – 2025**, Modeling Adoptive Cell Therapy in Bladder Cancer Using Physics-Informed Neural Network.

5. **2022 – 2024**, LinG3D: Visualizing the spatio-temporal dynamics of clonal evolution.

CONFERENCE PRESENTATIONS

1. **2026**, SIAM LS26, "Optimizing Adoptive Cell Therapy Injection Schedules for Melanoma using a Reinforcement Learning Approach", Cleveland, Ohio, July 6–9.
2. **2025**, MATHONCO25, "Modeling Adoptive Cell Therapy in Bladder Cancer Using Physics-Informed Neural Network with Adaptive Loss Weighting", St. Pete Beach, Florida, Oct 28–31.
3. **2025**, SIAM DS25, "Modeling Adoptive Cell Therapy in Bladder Cancer Using Physics-Informed Neural Network with Biology Constraints", Denver, Colorado, May 13.
4. **2024**, IMO 12: Toxicity, Moffitt Cancer Center, **Member of the Orange Team.** *Contributed code to the mathematical modeling of the cytostatic and cytotoxic effects of Gemcitabine on low- and high-ploidy cells. Served as one of the podium presenters*, November 3–8.
5. **2024**, SIAM LS24, I organized a Mini-Symposium, "Advances in Computational Modeling of Novel Tumor Treatments", I gave a Mini-Symposium talk, "A Predictive Tool for the Expansion of Tumor Infiltrating Lymphocytes in Patients' Bladder Tumor", Portland, Oregon, June 13.
6. **2024**, Moffitt Scientific Symposium, "An Early Determination of Patients' Eligibility for a Bladder Cancer Immunotherapy Using a Data Science Approach", Moffitt Cancer Center, May 8.
7. **2024**, SMB MathEpiOnco, "From COVID-19 to Melanoma: Modeling Time-Varying Treatment Response Using an Epidemiology-Informed Neural Network", *virtual*, February 18–20.
8. **2023**, IMO 11: Steering Evolution/Extinction, Moffitt Cancer Center, **Member of the Purple Team (First Place, awarded a $50,000 grant).** *Developed a deep learning–based toxicity index prediction model using temporal tumor burden, lab tests, and patient-reported outcome data*, October 29–November 3.
9. **2023**, U.S. National Congress on Computational Mechanics (USNCCM17), "A Machine Learning Protocol for Predicting Expansion of Tumor Infiltrating Lymphocytes in Patients' Bladder Tumors", Albuquerque, New Mexico, July 23–27.
10. **2023**, MATHONCO23, "ML-PETIL: A Machine Learning Predictor of the Expansion of Tumor Infiltrating Lymphocytes in Patients' Bladder Tumors", Phoenix, Arizona, April 30–May 4.
11. **2022**, Mathematics and Statistics Department Colloquium, "Mathematical Modeling of Adoptive Immunotherapy in B16 Melanoma: A Physics-Informed Machine Learning Approach", Bowling Green State University, November 4.
12. **2022**, IMO X: Cancer Communities, Moffitt Cancer Center, **Member of the Blue Team.** *Collaborated with Camara Casson to build a predictive model of cachexia in patients with non-small cell lung cancer (NSCLC). Presented as one of three podium speakers for the Blue Team*, October 31–November 4.
13. **2022**, Holistic Design of Time-Dependent PDE Discretizations Workshop, "Physics-Informed Attention Neural Network: Learning the Dynamics of Partial Differential Systems with an

Attention-Based Model", ICERM, Providence, Rhode Island, January 10–15.

14. **2021**, SIAM CSE21, "Data-Driven Deep Learning Algorithms for COVID-19 Time-Varying Infection Rates and Mitigation Measures", *virtual*, March 1–5.
15. **2021**, Graduate Research Showcase, "Learning Time-Varying COVID-19 Infection Rate from Data", Middle Tennessee State University, February 5.
16. **2020**, SIAM MDS20, "PDE-Based Neural Network Approach Using Noisy Data in Facial Recognition", *virtual*, May 5–7.
17. **2013**, "The Marshall–Simpson Differential Analyzer Project: Mechanical Interpretations of Mathematical Equations", Simpson College, Iowa, March 18.
18. **2012**, 40th Math & Stat Conf., "Generalization of First-Order Linear Differential and Difference Equations", Miami University, Oxford, Ohio.

POSTER PRESENTATIONS

1. **2026**, Moffitt Scientific Symposium, "Optimizing Schedules for Combination of Adoptive T Cells, Dendritic Cell Vaccines, and Anti-PD-L1 Treatments for Melanoma Using a Reinforcement Learning Approach", Moffitt Cancer Center, May 11.
2. **2025**, NeurIPS 2025 Workshop: Learning from Time Series for Health (TS4H), "Learning Model Parameter Dynamics in a Combination Therapy for Bladder Cancer from Sparse Biological Data", San Diego Convention Center, December 7.
3. **2025**, Moffitt Quantitative Science Octoberfest, "Learning Model Parameter Dynamics in a Combination Therapy for Bladder Cancer from Sparse Biological Data", Moffitt Cancer Center, October 20.
4. **2024**, Moffitt Quantitative Science Octoberfest, "An Early Determination of Patients' Eligibility Using a Data Science Approach", Moffitt Cancer Center, October 7.
5. **2023**, AACR Special Conference: Translating Cancer Evolution and Data Science—The Next Frontier, "An Early Determination of Patients' Eligibility Using a Data Science Approach", Boston, Massachusetts, December 3–6.
6. **2023**, Moffitt Quantitative Science Octoberfest, "A Machine Learning Protocol for Predicting Expansion of Tumor Infiltrating Lymphocytes in Patients' Bladder Tumors", Moffitt Cancer Center, October 23.
7. **2023**, Moffitt Scientific Symposium, "ML-PETIL: A Machine Learning Predictor of the Expansion of Tumor Infiltrating Lymphocytes in Patients' Bladder Tumors", Moffitt Cancer Center, May 16–17.
8. **2022**, CBAS Scholars Week, "Physics-Informed Attention Neural Network: Learning the Dynamics of Partial Differential Systems with an Attention-Based Model", Middle Tennessee State University, Murfreesboro, Tennessee, March 22.
9. **2021**, Modeling in a Heterogeneous World, XVIII Red Raider Mini-Symposium, "Data-Driven Deep Learning Algorithm for Asymptomatic COVID-19 Model with Time-Varying Transmission Rate", Texas Tech University, Lubbock, Texas, August 20–21.

PROFESSIONAL ACTIVITIES

1. **2024–present**, Associate Member, American Association for Cancer Research(AACR).
2. **2014–present**, Early Career Member, Society for Industrial and Applied Mathematics (SIAM).
3. **2022–present**, Standard Member, Society for Mathematical Biology (SMB).
4. **2023–present**, Standard Member, U.S. Association for Computational Mechanics (USACM).

PROGRAMMING SKILLS

1. **Machine Learning:** Python (PyTorch, TensorFlow, Keras, Scikit-learn, NumPy, SciPy, Pandas, Matplotlib)
2. **Computational Science:** JavaScript, Julia, MATLAB, Mathematica
3. **Statistics:** R
4. **Other Programming Languages:** C, C++

SOFTWARES

- **2026**, `MoCaPS`, a machine learning model to stratify cancer-associated cachexia based on blood biomarkers across cachexia stages: noncachexia (NCa), precachexia (PCa), cachexia (Ca), and refractory cachexia (RCa). In `MoCaPS`, we provide three tools to distinguish between NCa and Ca stages, PCa vs. Ca stages, and PCa vs. NCa stages. MoCaPS repository: https://github.com/okayode/MoCaPS.
- **2026**, `PETIL`, a tool that predicts possible tumor-infiltrating lymphocyte (TIL) expansion for individual patients, allowing determination of whether adoptive cell therapy (ACT) TIL therapy could treat an individual bladder cancer patient. PETIL repository: https://github.com/okayode/Predictor_of_the_Expansion_of_TIL_project.
- **2024**, `pyLinG3D`, a Python implementation of the LinG3D framework for generating 3D lineage trees–a visualization of spatio-temporal clonal evolution dynamics. pyLinG3D repository: https://github.com/okayode/pyLinG3D.

REFEREE FOR JOURNALS

- *ICML 2026 Workshop on Structured Data for Health – SD4H ICML 2026*
- *PLOS One*
- *npj Precision Oncology*
- *Radiation Oncology – BioMed Central*
- *NeurIPS 2025 Workshop on Learning from Time Series for Health – TS4H NeurIPS 2025*
- *Journal of Applied Mathematics and Computing*

SERVICE AND OUTREACH ACTIVITIES

May 2024	Moffitt Scientific Symposium

	Judge, Moffitt Postdoctoral Association (MPDA) Travel Award Competition for Best Poster, Moffitt Cancer Center, May 8.
2022–2025	High School Internship Program – Integrated Mathematical Oncology (HIP-IMO) **Lamees El Naqa**, "Investigating Model Parameter Dynamics of MDSCs in Combination Therapy for Bladder Cancer Using PINN" June 9 – August 01, 2025 **Haarika Makam**, "Machine Learning Techniques for Handling Missing Data of Bladder Cancer Patients" June 3 – July 26, 2024 **Risheet Jajoo**, "A Genetic Algorithm-based Manifold Learning Feature Selection Approach using Bladder Cancer Patients Data" June 5 – July 28, 2023
November 2023	Great American Teach-In (GATI) "Mathematics Can Improve Cancer Outcomes", Sand Pine Elementary School, Pasco County, FL, November 15.
2009–2010	National Youth Service Corps (NYSC) Headmaster, Bayo Foundation Elementary School, Bayo LGA, Borno State, Nigeria, December 2009 – July 2010. Mathematics Teacher, Junior High School, Briyel, Bayo LGA, Borno State, August 2009 – December 2009.