Joseph Baafi

PhD Candidate – Computational Biology & Mathematical Modeling

PROFILE

Computational biologist with a strong foundation in mathematical modeling, infectious disease dynamics, and ecological simulation. Experienced in analyzing large-scale biological and health datasets, building predictive models, and applying statistical methods to support data-driven decision-making. Proficient in R and Python, with hands-on expertise in data visualization, analysis, and interpretation. Actively exploring machine learning techniques to expand and complement skills in statistical modeling and biological data science.

KEY COMPETENCIES

Scientific
- R, Python, Git, LaTeX
- Statistical and predictive modeling
- High-throughput data analysis
- Model calibration and validation

Transferable
- Interdisciplinary collaboration
- Scientific communication
- Academic mentoring and training
- Project coordination and reporting

PROFESSIONAL EXPERIENCE

Doctoral Researcher (Computational Biology & Mathematical Modeling)   2020 – Present
Memorial University of Newfoundland – St. John's, NL

- Developed mechanistic and stochastic models to simulate infectious disease dynamics using R.
- Analyzed large-scale climate and ecological datasets, applying statistical methods and data visualization.
- Synthesized findings for publication and interdisciplinary communication across scientific teams.

Teaching Assistant (Data & Ecological Studies)   2020 – 2025
Memorial University of Newfoundland – St. John's, NL

- Led R-based tutorials and statistical modeling labs for undergraduate students.
- Co-developed technical guides and reproducible coding materials for scientific computing.
- Mentored students in data analysis, visualization, and model interpretation.

Research Intern (Public Health Data Modeling)   2019 – 2020
Mila - Quebec AI Institute – Montreal, QC

- Built predictive models using health and epidemiological datasets in Python and R.
- Applied machine learning techniques including regression and classification to real-world data.
- Practiced reproducible research and version control using Git in collaborative environments.

EDUCATION

Ph.D. Candidate, Biology (Mathematical Biology)
Memorial University of Newfoundland – St. John's, NL   May 2020 – Present
Expected Completion: December 2025

- Research in vector population dynamics and climate-driven disease modeling to support data-informed public health interventions
- Authored 2 peer-reviewed publications and delivered 6 research presentations

M.Phil., Applied Mathematics
Kwame Nkrumah University of Science and Technology – Kumasi, Ghana   Aug 2015 – Nov 2016

- Focused on infectious disease modeling, data-driven analysis, and optimal intervention strategies
- Produced 3 peer-reviewed publications and delivered 2 symposium presentations

M.Sc., Mathematical Sciences
African Institute for Mathematical Sciences – Accra, Ghana   Aug 2014 – Jun 2015

B.Sc., Mathematics
Kwame Nkrumah University of Science and Technology – Kumasi, Ghana   Aug 2009 – Jun 2013

TEACHING & ACADEMIC INSTRUCTION

Mathematics Lecturer   2016 – 2019
Valley View University & Anglican University College of Technology – Ghana

- Taught university-level courses in Statistics, Algebra, and Differential Equations with application to life sciences.

- Supervised 13 student research projects, fostering analytical and scientific writing skills.
- Developed interactive materials and assessments to enhance student engagement and learning outcomes.

Mathematics Teacher 2016 – 2019
Kwabre Senior High School – Akuma, Ghana
- Taught core and elective mathematics and supported students' preparation for national exams.
- Provided mentorship in quantitative reasoning and career pathways in STEM.

Teaching Assistant 2013 – 2014
Kwame Nkrumah University of Science and Technology – Kumasi, Ghana
- Conducted tutorials in Differential Equations and Mathematical Methods for undergraduates.
- Supported final-year student research and grading of technical coursework.

LEADERSHIP AND TRAINING

- **Committee Lead, OMNI-RÉUNIS Seminar Series** (2 years): Directed a team in organizing hybrid research seminars on infectious disease modeling, fostering interdisciplinary exchange and science communication.
- **AARMS-EIDM Summer School (Canada)**: Trained in model calibration, parameter estimation, and data-informed public health modeling using R.
- **Epidemiological Modeling Clinic (AIMS-Ghana)**: Applied dynamical systems and computational techniques to analyze real-world disease data.
- **CareerTech Data Analytics Workshop**: Enhanced practical skills in data wrangling, R-based visualization, and results communication for research audiences.

PUBLICATIONS

1. **Baafi, J.**, & Hurford, A. (2025). Modeling the Impact of Seasonality on Mosquito Population Dynamics: Insights for Vector Control Strategies. *Bulletin of Mathematical Biology*, 87(2), 33. DOI: 10.1007/s11538-024-01409-7
2. Martignoni, M. M., Renault, J., **Baafi, J.**, & Hurford, A. (2022). Downsizing of COVID-19 contact tracing in highly immune populations. *Plos one*, 17(6), e0268586. DOI: 10.1371/journal.pone.0268586
3. **Baafi, J.**, Darko, I. O., & Asenso, F. W. (2017). Vaccination as a control of infectious diseases. *J Appl Computat Math*, 6(357), 2. Available online
4. Oduro, F. T., **Baafi, J.**, & Apaaboah, G. (2016). Modelling the effect of post-mortem contact on the spread of ebola with quarantine as an intervention. *Journal of Mathematics Research*, 8(4), 176. https://doi.org/10.5539/jmr.v8n4p176
5. Oduro, F. T., Apaaboah, G., & **Baafi, J.** (2016). Optimal control of Ebola transmission dynamics with interventions. *British Journal of Mathematics & Computer Science*, 19(1), 1-19. Available online