

Prof. George Owuor Lawi

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AEN-1872-2022



Associate
Professor of
Biomathematics

Professional Summary

I am an Associate Professor of Biomathematics at Masinde Muliro University of Science & Technology (MMUST), Kenya currently serving as the Academic Leader in Applied Mathematics (MMUST), a member of the departmental graduate studies committee, a Member of African STACK Leadership, co-founder of African STACK Hub hosted at MMUST, Co-Pi CoNeMEsSA (Competence Network on Mathematical Epidemiology in sub-Saharan Africa), and the founding Director for CEASR (Center of Excellence in Applied Science Research)

I am a researcher in Mathematical modeling spanning across Epidemiological dynamics, Ecological systems, and Chemical Reaction Networks, where I have supervised over 22 postgraduate students (PhD and MSc) and contributed to curriculum development and review for several universities in Kenya. My current research activities include multiscale modeling and optimal control of infectious diseases. As a Mathematics Educator, I am dedicated to advancing teaching, learning, and assessment through innovative and context-sensitive approaches. I have a strong commitment to integrating technology in mathematics (STEM) education, particularly within low-resource learning environments. My current work focuses on the development of teaching and learning materials available through open source spaces, such as the System for Teaching and Assessment using Computer algebra Kernel (STACK).

I also serve as an External Examiner (Thesis examination and exam moderation) in Applied Mathematics for Moi University, Karatina University, Laikipia University, Egerton University and University of Kabianga.

Outside of the Universities, I serve as Patron and mentor to over 500 youths at ACK All Saints Parish Maseno, and the Chairman of the Finance Committee at ACK All Saints Parish Maseno. Currently also serving as the Vice Chairperson of Trinity Fellowship (Kenya), Chairman Board of Management for Faith Ventures Christian Academy, Trinity Fellowship (Kenya) and Chairman of the Academic standards, Quality and Environment Committee of BOM for Kuoyo Mixed Secondary School.

Contacts/Sites/Pages

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- researcherid: AEN-1872-2022
- Google site: <https://sites.google.com/view/georgeolawi>

Academic Background

- Ph.D. **Applied Mathematics**, Maseno University, Kenya, Specialization: Biomathematics –
2009-2013 Dynamical Systems in Epidemiology- Modelling persistent childhood infectious diseases-
Supervised by **Prof. Mugisha and Prof. Ongati**
- M.Sc. **Applied Mathematics**, Maseno University, Kenya, Specialization: Numerical Analysis-
2003-2005 heat transfers in porous media - Supervised by **Prof. Manyonge and Prof. Ongati**
- B.Ed.1993- **Bachelor of Education Science (Mathematics & Physics)**, Kenyatta University,
1997 Kenya, Second Class Upper Division

Academic/Research Responsibilities

○ Responsibilities

- 1 Program Leader-Applied Mathematics, Department of Mathematics MMUST.
- 2 Founding Director, African STACK Centre, Department of Mathematics MMUST.
- 3 Founding Director Centre for Research in Applied Science
- 4 Founder and Lead Researcher at the Mathematical Epidemiology Lab (), Centre for Research in Applied Science

Work Experience

- Sep 2021 – **Associate Professor**, Masinde Muliro University of Science & Technology (MMUST),
Present Teaching undergraduate and postgraduate courses, mentoring MSc and PhD students,
conducting research, building networks and collaborations
- Oct 2016 – **Senior Lecturer**, Masinde Muliro University of Science & Technology (MMUST), Taught
Aug 2021 applied mathematics courses at undergraduate level before full-time appointment.
- Jul 2011 - **Lecturer**, Masinde Muliro University of Science & Technology (MMUST), Taught applied
Sep 2016 mathematics courses at undergraduate level.
- Jul 2013 - **Chairman Department of Mathematics**, Masinde Muliro University of Science &
Dec 2014 *Technology (MMUST)*
- Feb 2007– **Lecturer**, Maseno University, Taught undergraduate students in mathematics, numerical
Dec 2013 analysis, and mathematical modelling.
- Sep 2008 – **Part-time Lecturer**, Masinde Muliro University of Science & Technology (MMUST),
Jun 2008 Taught applied mathematics courses at undergraduate level prior to full-time appointment.
- Sep 2006 – **Lecturer**, Kabarak University, Taught undergraduate mathematics courses.
Dec 2007
- Jan 1998 – **Teacher (Mathematics & Physics)**, Keveve Girls High School, Taught mathematics
Dec 2007 and physics, mentoring students and coordinating science activities.

Research Interests

Mathematical Modelling of Infectious Diseases - Multiscale modeling, between and within host modeling, predator-prey models, chemical reaction and network modeling

Numerical Analysis and Computational Modelling

Optimal Control of Dynamical Systems

Selected Publications

- 2025 M. W. d'A. Dogbalou, **G. Lawi**, H. Otieno, A. Rodriguez-Garcia, D. Lewański. *Leveraging Large Language Models to Identify and Classify Student Errors in Higher Education Mathematics Using the STACK Dataset* Proceeding of the AFRICME 7 conference in South Africa (peer reviewed, 2025).
- 2024 Phoebe Amadi , **George Lawi** , Job Bonyo* *A Metapopulation Model for Cholera with Variable Media Efficacy and Imperfect Vaccine*. Journal of Mathematical Sciences and Modelling, 7(1), 20–32 (2024).<https://doi.org/10.33187/jmsm.1289684>

- 2023 **George Lawi**, Santiago Borio, Michael Obiero Oyengo, and Juma Zavick. *Case Study: The First African STACK Conference for Undergraduate Mathematics*. STACK Assessment Case Studies (2023)
- 2022 C. M. Wachira, **G. O. Lawi**, and L. O. Omondi. *Travelling Wave Analysis of a Diffusive COVID-19 Model*. Journal of Mathematics. DOI:10.1155/2022/6052274
- 2022 C. M. Wachira, **G. O. Lawi**, and L. O. Omondi. *Sensitivity and Optimal Control Analysis of an Extended SEIR COVID-19 Mathematical Model*. Hindawi Journal of Mathematics. DOI:10.1155/2022/1476607
- 2020 Florence A. Adongo, Lawrence O. Onyango, Job Bonyo, **G.O. Lawi**, Ogada A. Elisha A *Delayed Vaccination Model for Rotavirus Infection*. European Journal of Pure and Applied Mathematics, 13(4):840–851. DOI:10.29020/nybg.ejpam.v13i4.3822
- 2019 D. O. Oganga, **G. O. Lawi**, and C. O. Okaka. *Stability Analysis of the Endemic Equilibrium of an Ebola Disease Model*. Applied Mathematical Sciences, 13(21):1001–1012.
- 2019 Samuel A. B., **George L. O.**, and Kagendo N. J. *Rosenzweig–MacArthur Model with Holling Type II Predator Functional Response for Constant Delayed Migration*. Asian Research Journal of Mathematics, 15(1):1–14.
- 2018 B. Mobisa, **G.O.Lawi**, and J.K.Nthiiri *Modelling In Vivo HIV Dynamics under Combined Antiretroviral Treatment* Hindawi Journal of Applied Mathematics Volume 2018, Article ID 8276317, 11 pages <https://doi.org/10.1155/2018/8276317>

Graduate Supervision

○ PhD Students

- 1 Kagendo Joyce - Mathematical Modelling of Tuberculosis and Pneumonia as Opportunistic Respiratory Co-infections in HIV/AIDS in the Presence of Protection, PhD Applied Mathematics, Maseno University, (Completed 2016).(with Prof. Manyonge)
- 2 Mark Okon'go - Modeling HIV/AIDS coinfection with Malaria and Tuberculosis in the Presence of Treatment and Counselling. PhD Applied Mathematics, Chuka University, (Completed 2016). (with Dr. Musundi)
- 3 Joseph Pale -Influence of Pedagogical Practices on Probability Achievement Outcomes and Attitudes of Secondary School Students in Bungoma County PhD Mathematics Education MMUST, (Completed 2018). (with Professor Toili)
- 4 Franline Kibiwot Tireito-Mathematical Analysis of HIV/AIDS Diffusive Model Incorporating Antiretroviral and Prophylaxis Use, PhD Applied Mathematics MMUST, (Completed 2018). (with Dr. Akinyi C. O.)
- 5 Harun Makwata -Modelling the Dynamics of Fishery with Allee Effect PhD Applied Mathematics MMUST, (Completed 2019). (with Dr. Akinyi C. O.)
- 6 . Mobisa Benson -An Immunoepidemiological Model for HIV incorporating Viral and Cellular Transmission with ARV treatment. PhD Applied Mathematics MMUST,(Completed 2020). (with Dr. Kagendo J.)
- 7 Oganga Duncan-Multiscale Modelling of Ebola Disease Transmission Dynamics PhD Applied Mathematics MMUST, (Completed 2021). (with Dr. Akinyi C.)
- 8 Apima Samuel-A Predator-Prey Model With Logistic Growth For Constant And Variable Delayed Migration. PhD Applied Mathematics MMUST, (Completed 2020) (with Dr. Kagendo J.)
- 9 Achieng' Brenda Onyango An Age-dependent Susceptibility and Differential Infectivity of an Ebola Model with intervention. PhD Applied Mathematics MMUST (Completed 2022 with Dr. Tireito)
- 10 . Wachira C. Muriuki A Diffusive Mathematical Model for Covid 19 with Varying Transmission Rate and Vaccination. PhD Applied Mathematics MMUST (Completed 2022 with Dr Lawrence Omondi)
- 11 Lilian Kwamboka Modelling Fair Allocation of Scarce Resources in Multi-Disease Post Disaster Outbreak PhD Applied Mathematics, MMUST University, (2024 Ongoing). (with Prof. Johannes Muller)

○ MSc Students

- 1 Tireito Frankline Kibiwot, (2013). -A Deterministic Delay Model of the Spread of HIV in a Homogeneous Population MSc Applied Mathematics, (Completed). (with Prof. Adu)
- 2 Apima Samuel (2013)-A Predator-Prey Model Incorporating Delay in Migration, MSc Applied Mathe-

- atics, (Completed). (with Prof. Adu)
- 3 Chinyingi Patrick (2013) - Mutual Inhibition With Hollying type III functional Response in a Two species Chemostat-like Model, MSc Applied Mathematics, (Completed). (with Prof. Adu)
 - 4 Mbete Drinold (2013) -Estimation of Basic Reproduction Number in a Deterministic Model: A Case of Malaria- Rotavirus Co-infection , MSc Applied Statistics, (Completed). (with Prof. Nyongesa)
 - 5 Achieng Brenda (2016) -Modelling the impact of delay in media coverage on the Dynamics of Ebola in a logistically growing population, MSc Applied Mathematics MMUST (Completed 2016). (with Joyce Kagendo)
 - 6 Makokha Francis F. -A Bayesian Estimation of Disease Prevalence Rate in a Two-Phase study using two imperfect tests MSc Applied Statistics MMUST (Completed 2017). (with Dr. Otumba E)
 - 7 Musundi Beryl -Modelling Cholera Transmission Incorporating Media Coverage MSc Applied Mathematics Moi Univ, (Completed 2017). (with Dr. Nyamwala)
 - 8 Lilian Kwamboka Modelling the role of screening of Immigrants as a control against the spreadof Ebola MSc Applied Mathematics, Maseno University, (Completed 2017). (with Prof. Manyonge)
 - 9 Abraham Mabwago -Modelling Delay in migration for constant predator and predator-density dependent prey dispersal MSc Applied Mathematics, Maseno University, (Completed 2020). (with Dr. Joyce Oduor)
 - 10 Oigo Nathan -Modelling the Dynamics of Radicalisation with Government Intervention, MSc Applied Mathematics MMUST (Completed 2018). (with Dr. Joyce Kagendo)
 - 11 Wachira Charles-A Spatio-Temporal Model on the Transmission Dynamics of Zika Virus Disease, MSc Applied Mathematics MMUST (Completed 2018). (with Dr. J. Malinzi)
 - 12 Owade Jacob Modelling The Role of Rehydration and Antibiotic Treatment on reduction of Cholera Mortality, MSc Applied Mathematics MMUST (Completed 2018). (with Dr. C.A. Okaka)
 - 13 Pheobe Amadi - A Metapopulation Model for Cholera with variable and imperfect control strategies MSc Applied Mathematics, Maseno University, (Completed 2021). (with Dr. J. Bonyo)
 - 14 Okumu Brenda- A Diffusive model of Ebola Transmission MSc Applied Mathematics, Maseno University, (Completed 2021). (with Dr. R. Opiyo)
 - 15 Oriedo Samson Indayi- Mathematical Modelling of Dual Protection and ART Adherence for a High Risk HIV Population MSc Applied Mathematics, Maseno University, (Completed 2023). (with Dr. J. Bonyo)
 - 16 Erick Opiyo-Mathematical Modelling of Human Papiloma Virus (HPV) with Vaccine Hesitancy MSc Applied Mathematics MMUST (2025 Ongoing). (with Prof. Johannes Muller)
 - 16 Ogutu Trizer Nabwire -Optimal Control Analysis of Cholera Epidemic with Seasonality, MSc Applied Mathematics MMUST (2025 Ongoing). (with Dr. Joshua Kiddy, Department of Mathematics Asamoah, KNUST, Ghana)

Professional Membership & Service

Member, Society for Mathematical Biology

Member, Kenya Mathematics Society

Trustee Elected MMUST (SRBS) Staff Retirement Benefits Scheme

Chair of Academic standards, Quality and Environment committee, BoM – Kuoyo Secondary School

Member, Curriculum Review and Development Committees (MMUST, JOOUST, Multi-media University, Moi University)

Grants won

2022 **Volkswagen Foundation Grant for Summer School at Moi Univesity**, *Jointly with Technical University of Munich, Masinde Muliro University of Science & Technology and Kwameh Nkuruma University of Ghana*, Kenya, .

Amount Ksh 11million

2023 **European Mathematical Society(EMS)-Conference funding for 1st African STACK Conference for Undergraduate Mathematics**, *Hosted by Masinde Muliro University of Science & Technology*, Kenya, .

Amount USD 3000

- 2023 **SAMI-Supporting African Maths Initiatives-Conference funding for 1st African STACK Conference for Undergraduate Mathematics**, *Hosted by Masinde Muliro University of Science & Technology*, Kenya, .
Amount USD 1500
- 2023 **The University of Geneva-Conference funding for 1st African STACK Conference for Undergraduate Mathematics**, *Hosted by Masinde Muliro University of Science & Technology*, Kenya, .
Amount USD 4000
- 2024 **CODESRIA Advanced Senior Research Grants for Higher Education Studies**, *Collaboration: Kenyatta University, University of Eldoret and MMUST*, Kenya, .
Amount USD 15000
- 2024 **DAAD-SDG Partnership**, *Jointly with Technical University of Munich, Masinde Muliro University of Science & Technology, University of Lagos and Kwameh Nkuruma University of Ghana*, .
Amount Euros 334000
- 2024 **Erasmus KA171 Mobility Grant**, *Jointly with Trieste University and Maseno University*, .
Amount Euros 29109

Conferences & Workshops Attended

- 2025 **DAAD-SDG Symposia** Theme: Global Responsibility -Local Impact University of Cape Town, South Africa, October 13-17th 2025
- 2025 **CoNeMEsSA (Competence Network Mathematical Epidemiology in sub-Saharan Africa) Workshop 2025**, Moi University, Eldoret, Kenya. Theme: Advancing Epidemiological Modeling and Optimal Control Strategies for Diseases Transmission in the Technological Era. (15th–19th Sept 2025, Sirikwa Hotel).
- 2025 **Pension and Data Protection Laws Summit**, Sarova Woodlands Nakuru, Kenya, 23rd -27th June 2025.
- 2024 **CoNeMEsSA Workshop 2024** Lagos, Nigeria. Theme: Innovative Mathematical and Statistical Approaches
- 2024 **2nd STACK African Conference for Undergraduate Mathematics**, hosted by Technical University of Kenya (TUK)
- 2024 **American Institute of Mathematics Workshop on Open Source Mathematics Curriculum and Assessment Tools** hosted at Kisumu Hotel 5-9, August 2024.
- 2024 **Effective Boards and Board Tools Workshop**, Sarova Woodlands Nakuru, Kenya, 24th -28th June 2024.
- 2024 **17th International Multi-disciplinary Blended Conference**, Masinde Muliro University of Science & Technology (MMUST), 15–17 May 2024. Theme: Harnessing Frontier Research in Science, Technology and Innovation for Sustainable Development
- 2023 **CIMPA Summer School Facilitator -Mathematical Modelling of Chemical Reaction Networks: Basic Tools, Applications, and Open Challenges Nairobi, 17th- 28th July 2023** hosted by University of Nairobi, Kenya
- 2023 **Summer School at Moi University (VolkswagenStiftung)-“Models, Statistics, and Genetics: Understanding epidemics”**, hosted by Moi University, March 2023, Kenya
- 2023 **1st STACK(System for Teaching and Assessment using Computer algebra Kernel) African Conference**, hosted by Masinde Muliro University of Science & Technology
- 2022 **Trustee Development Program Kenya (TDPK)– Trustee Certification**, College of Insurance, Dec 2022 Kenya.

- 2022 **Training Workshop-Enhancing Quality and Internationalization of Mathematics Doctoral Supervision**, hosted by Moi University, Kenya
- 2019 **Presented a review titled “ Contributions of Mathematical and Computational Modeling in exploring Complex Biological systems and Processes at the Biophysics conference organised and hosted by MMUST from 3-4th July 2019.Theme: Exploring Biophysics Diversity for Sustainable Industrial and Economic Development**
- 2019 STACK Workshop: Improving 1st Year Mathematics and Statistics University Courses Using Digital Technologies (Maseno University, Kenya)
- 2019 Integrity Assurance Officer’s Course(National Integrity Academy)
- 2018 ISO Quality Assurance Training: Implementers for Transition,Change and Impact Awareness
- 2015 Certificate of Participation-MMUST Performance Contract Negotiation and Vetting
- 2014 Course assessment and examination for INTERNAL QUALITY AUDITORS TRAINING
- 2014 Training – Curriculum Review and Development Committee Member Workshops (MMUST, JOOUST, Multimedia University, Moi University).
- 2013 2nd Strathmore University International Mathematics Conference
- 2011 First Kenyatta University International Mathematics Conference
- 2011 1st Strathmore University Mathematics Conference
- 2008 Team Building and E-learning Workshop (Kenya Pipeline Training and Conference Center)

Community Outreach

Patron and mentor to over 500 youths at ACK All Saints Parish Maseno.
 Chairman of Finance Committee, ACK All Saints Parish Maseno.
 Vice Chairperson, Trinity Fellowship (Faith-based educational outreach across East and Central Africa).
 Chairman, Board of Management – Faith Ventures Christian Academy.
 Chairman of Academic Committee, Board of Management – Kuoyo Secondary School, Kisumu West Sub-County, Kenya.
 Member (Elected-Representing Academic Staff) Board of Trustees, MMUST Staff Retirement Benefits Scheme
 Actively engaged with the youth in learning institutions and church on Life Coaching Skills and Career Guidance

Additional Activities

Entrepreneur running a welding/metal fabrication workshop, providing youth technical welding/metal fabrication skills.
 Runs a dairy unit for local milk production and sustainable agribusiness.
 Cultivates native vegetables and maintains an orchard promoting local food sustainability.

Academic Referees

- Prof. J.Y. T. Mugisha, Department of Mathematics and Principal College of Natural Sciences , Makerere University, P.O.Box 7062, Kampala, Uganda. joseph.mugisha@mak.ac.ug
- Prof. John Ogonji, School of Mathematics, Maseno johnagure@maseno.ac.ke