RICHARD KWAME ANSAH

Associate Professor in Mathematics and Statistics

University of Energy and Natural Resources (UENR), Ghana • Staff No. PSM 296

1. Personal Information

Name: Richard Kwame Ansah

Date of Birth: 30th July, 1988

Nationality: Ghanaian

Marital Status: Married

Religion: Christianity

2. Academic Degrees Earned, with Institutions Attended

Period	Qualification	Institution
2017 – 2023	Ph.D. (Pure Mathematics)	Kwame Nkrumah University of Science and Technology, Kumasi
2013 – 2015	M.Phil. (Pure Mathematics)	Kwame Nkrumah University of Science and Technology, Kumasi
2008 – 2012	B.Sc. (Mathematics)	Kwame Nkrumah University of Science and Technology, Kumasi
2004 – 2007	WASSCE (General Science)	Ghana Secondary Technical School, Takoradi
2001 – 2004	BECE	Air Force Junior High School, Takoradi

3. University Teaching and Research Experience

3(a) Courses Taught

- Dynamical Systems (M.Phil. Applied Mathematics)
- Functional Analysis (M.Phil./Ph.D. Mathematics)
- Complex Analysis (Third Year Mathematics)
- Measure Theory and Integration (Final Year Mathematics)
- Topology (Third Year Mathematics)
- Real Analysis (Second Year Mathematics)
- Functional Analysis (First Year M.Phil. Mathematics)
- Abstract Algebra (Second Year Mathematics)
- Linear Algebra (Second Year Mathematics, Statistics, Actuarial Science)
- Linear Algebra for Engineers (Second Year, School of Engineering)
- Linear Algebra for Scientists (First Year Chemistry)
- Vectors and Coordinate Geometry (First Year Mathematics, Statistics, Actuarial Science)
- Engineering Mathematics (First Year Engineering, First Semester)

3(b) Supervision of Student Project Work

Postgraduate and undergraduate project works designed and supervised have focused on the practical application of mathematical methods — particularly statistical mechanics and mean-field models — to real-life problems.

M.Phil. (Applied Mathematics)

- Limit theorems for the Quintic Mean Field Ising Model. (2024/2025 Academic Year).
- Modelling Two-Party Political Dynamics using a Sextic Mean Field Ising Model. (2024/2025 Academic Year).
- Risk Measures Associated with Automobile Insurance Losses in Ghana Using Composite Distributions. (2023/2024 Academic Year).

B.Sc. (Mathematics, Statistics, Actuarial Science)

- Analysing the Influence of Alcoholism and Treatment Duration on Complications in Hypertensive Patients: A Statistical Mechanics Approach. (2024/2025 Academic Year)
- Advancing the Inverse Problem in Statistical Mechanics: A Five-Body Interaction Perspective (2023/2024 Academic Year)
- Emergent Behaviours in AI-Human Systems: Insights from Statistical Mechanics (2023/2024 Academic Year)
- Examining the Determinants Affecting Bed Net Use for Children Under Five Among Ghanaian Women: A Statistical Mechanics Approach. (2022/2023 Academic Year)
- Mathematical Modelling of Decision Making: A Case of Covid-19 Vaccination Choices in Ghana. (2022/2023 Academic Year)
- The Effect of Insecticide Mosquito Net on Hemoglobin Values Among Pregnant and Non-Pregnant Women in Ghana. (2021/2022 Academic Year)
- Mathematical Modeling of Decision Making: The Case of Motor Insurance Choices. (2020/2021 Academic Year)
- Statistical Modeling of Frequency and Time to Event of Insurance Claims. (2019/2020 Academic Year)
- Modelling the Joint Distribution of Claim Frequency and Severity using Copulas. (2019/2020 Academic Year)
- An Algorithm for License Plate Recognition Applied to Intelligent Transportation System. (2018/2019 Academic Year)
- Predicting Loan Repayment Default Using Logistic Regression (2017/2018 Academic Year)
- The Mathematics Behind the Google Search Engine (2017/2018 Academic Year)
- The Ising Model and its applications (2017/2018 Academic Year)
- The Review of The Potts Model and Its Applications (2017/2018 Academic Year)
- Elliptic Curve Cryptography (2016/2017 Academic Year)
- Perfect Numbers and Ore Harmonic Numbers (2016/2017 Academic Year)

4. List of Publications

1. **Ansah, R. K.,** Boadi, R. K., & Tawiah, K. (2026). Limit theorems for the multispecies Curie-Weiss Potts model. The European Physical Journal Plus, 141(5), 605.
2. **Ansah, R. K.,** Boadi, R. K., Tawiah, K., & Addo, D. A. (2026). Mean-field modelling of opinion polarization and structural misinformation susceptibility in online communities. Journal of Statistical Mechanics: Theory and Experiment, 2026(7), 073402.
3. **Ansah, R. K.** (2026). Macroscopic dynamics and phase transitions in a bipartite mean-field model with averaged coupling. AIP Advances, 16(5).
4. **Ansah, R. K.,** Owusu-Sarfo, J., Tawiah, K., & Kwofie, C. (2026). Gaussian and non-Gaussian fluctuations in the two-and five-spin mean-field ising model. Physica Scripta, 101(22), 225209.

5. Qureshi, M., Ismail, M., Daniyal, M., Haq, I., Tawiah, K., Bukari, F. K., **Ansah, R. K.,** & Asosega, K. A. (2026). Characterizing critical sources of carbon emissions using principal component analysis. The Scientific World Journal, 2026(1), 6175776.

6. Tawiah, K., Frempong, N. K., Adebanji, A. O., Asosega, K. A., & **Ansah, R. K.** (2026). A Newton-Raphson approach to trivariate Poisson regression modeling: a simulation study. Journal of Simulation, 1-18.

7. **Ansah, R. K.,** Tackie, S., Asosega, K. A., Tawiah, K., Danquah, B. A., Appiah, S. T., ... & Omane-Adjepong, M. (2025). Untangling choices: how awareness and socio-economic status shape malaria vaccination decisions among Ghanaian women. Malaria Journal, 24(1), 1-10.

8. Tawiah, K., **Ansah, R. K.,** Asosega, K. A., Edusei, K. O., Bukari, F. K., & Dwamena, H. A. (2025). Understanding sanitation behaviour in Ghana: the impact of wealth and residential contexts on Ghanaian women's choices. Discover Global Society, 3(1), 125.

9. **Ansah, R. K.,** & Tawiah, K. (2025). Critical phenomena in the mean-field Ising model with five-spin coupling and magnetic field. Physica Scripta, 100(7), 075245.

10. **Ansah, R. K.,** Tawiah, K., & Abbey, R. N. O. (2025). Advancing the inverse problem in statistical mechanics: A five-body interaction perspective. Physica A: Statistical Mechanics and its Applications, 130700.

11. **Ansah, R. K.,** Boadi, R. K., Obeng-Denteh, W., Asosega, K. A., & Tawiah, K. (2025). Exploring cooking fuel choices among Ghanaian women of reproductive age: A socio-economic analysis from a statistical mechanics perspective. PloS one, 20(1), e0317004.

12. **Ansah, R. K.,** Ablordeppey, P., Boadi, R. K., & Tawiah, K. (2024). Numerical simulations of AI–human interaction using quintic mean-field Ising model. AIP Advances, 14, (085117).

13. **Ansah, R. K.,** Opoku, A. A., Tawiah, K., Boadi, R. K., Gana, B. N. A., Tackie, S., ... & Ampofo Mills, S. M. (2024). Mathematical modelling of decision making: the case of motor insurance choices. Journal of Mathematics in Industry, 14(1), 1-17.

14. Tawiah, K., Asosega, K. A., Iddi, S., Opoku, A. A., Abdul, I. W., **Ansah, R. K**., ... & Adebanji, A. O. (2024). Assessment of Neonatal Mortality and Associated Hospital-Related Factors in Healthcare Facilities Within Sunyani and Sunyani West Municipal Assemblies in Bono Region, Ghana. Health Services Insights, 17, 11786329241258836.

15. **Ansah, R. K.,** Tawiah, K., Asosega, K. A., Kwofie, C., Kumi, W., & Yalley, E. (2024). The Effect of Sociodemographic Factors on Female Educational Attainment: An Application of the Multipopulation Curie–Weiss Model. Journal of Applied Mathematics, 2024(1), 9773407.

16. **Ansah, R. K.,** Boadi, R. K., Obeng-Denteh, W., Tawiah, K., & Appiah, S. T. (2024). Exploring mean field spin models with multiple populations: A theoretical framework. AIP Advances, 14(5).

17. **Ansah, R.K.,** Tackie, S., Twum, R.A., Tawiah, K., Boadi, R.K., Addo, D.A., Effah-Poku, S. and Zigli, D.D., 2024. The relationship between anaemia and the use of treated bed nets among pregnant and non-pregnant women in Ghana. Plos one, 19(5), p.e0300431.

18. Iftikhar, H., Daniyal, M., Qureshi, M., Tawaiah, K., **Ansah, R. K.,** & Afriyie, J. K. (2023). A hybrid forecasting technique for infection and death from the mpox virus. Digital health, 9, 20552076231204748.

19. **Ansah, R.K.,** Boadi, R.K., Obeng-Denteh, W. et al. Inverse problem for the quartic mean-field Ising model. Eur. Phys. J. Plus 138, 626 (2023).

20. Tawiah, K., Asampana Asosega, K., **Ansah, R. K.,** Appiah, S. T., Otoo, D., Aponye, I. A., ... & Addai, I. M. (2023). Confirmed Malaria Cases in Children under Five Years: The Influence of Suspected Cases, Tested Cases, and Climatic Conditions. Health & Social Care in the Community, 2023.

21. Yalley, E., Armah, G., T., **Ansah, R. K.** (2021). Effect of the VAN Hiele Instructional Model on Students' Achievement in Geometry. Educational Research International 2021(2):1-10.

22. **Ansah, R. K.,** Effah-Poku, S., Addo, D. A., Adjei, B. A., Bawuah, B. K., & Antwi, P. (2018). Relevance of elliptic curve cryptography in modern-day technology. Journal of Mathematical Acumen and Research, 3(2).
23. Kwofie, C., & **Ansah, R. K.** (2018). A study of the effect of inflation and exchange rate on stock market returns in Ghana. International Journal of Mathematics and Mathematical Sciences, 2018, 1-8.
24. Opoku, A. A., Edusei, K. O., & **Ansah, R. K.** (2018). A conditional Curie–Weiss model for stylized multi-group binary choice with social interaction. Journal of Statistical Physics, 171(1), 106-126.
25. **Ansah, R. K.,** Boadi, R., Obeng-Denteh, W., & Omari-Sasu, A. Y. (2016). Review of the birch and swinnerton-dyer conjecture. Am J Math Stat, 6(4), 182-189.
26. Obeng-Denteh, W., Kodua-Nana, O., & Owusu, A. S, **Ansah, R. K.** (2012). Modelling students' affinity for lecture attendance using differential equations: The case of students of Kwame Nkrumah University of Science and Technology. British Journal of Education, Society and Behavioural Science, 2(4), 389-401.

5. Peer-Review Experience

Reviewer for the following international journals and publishers:

- PLOS One (26)
- Wiley — Health Science Reports (1)
- SAGE Open (1)
- Springer Nature — International Journal of Applied and Computational Mathematics (1)
- Springer Nature — BMC Public Health (1)
- Elsevier — Public Health in Practice (1)
- Natural Sciences Publishing — Journal of Statistics Applications and Probability (1)
- Elsevier — Scientific African (1)
- Elsevier — Decoding Infection and Transmission (1)

6. Membership and Activities in Professional Associations

- Member, Ghana Science Association (GSA) — January 2020 to date
- Member, University Teachers Association of Ghana (UTAG)
- Member, Authors' Licensing and Collecting Society (ALCS) — July 2023 to date

7. Record of Service to the Community (UENR)

- Chairman, Publicity Committee for UENR Science Fair, School of Sciences
- Member, Council of Convocation — August 2025 to date
- Member, Academic Board (School of Science Representative) — October 2025 to date
- Admission Drive Coordinator, Department of Mathematics and Statistics, UENR — 2025-2026
- Weekend Coordinator and E-learning Coordinator, Department of Mathematics and Statistics, UENR — 2024-2025
- E-learning Coordinator, Department of Mathematics and Statistics, UENR — 2023-2024
- Admission Drive Coordinator, Department of Mathematics and Statistics, UENR — 2021-2023
- Staff Seminar Coordinator, Department of Mathematics and Statistics, UENR — 2019-2021
- Examinations Officer, Department of Mathematics and Statistics, UENR — 2017-2019
- Academic Tutor, Department of Mathematics and Statistics, UENR — 2017 to date

- Secretary, Department of Mathematics and Statistics Board Meeting, UENR — 2016-2018
- Patron, Tertiary Minds Ghana (TMG), UENR — February 2023 to date

8. Conferences, Seminars, Workshops, and International Academic Engagements

- Erasmus+ KA171 International Credit Mobility (ICM) – Staff Mobility for Training, 2025/2026 Academic Year. Institutional Coordinator, Erasmus+ KA171 Staff Mobility Programme, University of L'Aquila, Italy.
- Advanced School and Workshop: StatPhys, Kigali, Rwanda (5–10 July 2025) — Poster Presentation.
- The Deep Learning Indaba, University of Ghana, Accra (3–9 September 2023) — Poster Presentation.
- Workshop on "Understanding the Core Issues of the Appointments and Promotions Criteria," UENR, Sunyani (20 October 2021) — Participant.
- Workshop on "Probability, Analysis, and Applications," AIMS Ghana, Accra (30 September – 4 October 2019) — Participant.
- Workshop on "Good Assessment Practices in Higher Education: Improving Teaching and Learning," Sheila's Executive Hotel, Sunyani (16–17 January 2019) — Participant.
- Conference on "Scientific Computing and Industrial Modelling Tool for Accelerating Innovation," Amonoo-Neizer Conference Center, KNUST (27 November – 1 December 2017) — Participant.