**SARAH FOBI MENSAH**

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**RESEARCH INTERESTS**

High dimensional data analysis (particularly in health-related applications), functional data analysis, dimensionality reduction techniques, regression modeling and machine learning.

**EDUCATION**

**Ph.D. Statistics,** GPA: 3.9Expected: 12/ 2027

Montana State University, Bozeman, MT

**M.S. Statistics**, GPA: 3.89 05/2024

Montana State University, Bozeman, MT

**B.S. Actuarial Science**, GPA: 3.89 09/ 2021

Kwame Nkrumah University of Science and Technology,Kumasi, Ghana

**WORK EXPERIENCE**

**Montana State University, Bozeman, MT**

**Graduate Researcher** 08/2024 - present

* Conducted statistical analysis of microcalorimeter data to study chondrocyte heat generation toward improving knowledge of chondrocyte central metabolism.
* Applied a Generalized Least Squares (GLS) model to account for non-constant variance which helped to accurately assess the differences in total heat generation across cell groups.
* Led initial findings to a manuscript submission within 4 months and currently expanding the research through functional data analysis to examine heat generation curves over time.

**Graduate Research Assistant** 12/2023 – 05/2024

* Explored dimensionality reduction techniques, including sparse PCA, to enhance interpretation and analysis of high- dimensional metabolomics data for early osteoarthritis diagnosis.
* Investigated the potential of sparse contrastive PCA to reduce the dimensionality of metabolomics data, making it manageable, more interpretable and useful for identifying early molecular markers of osteoarthritis.

Osteoarthritis grant funded byNational Institute of Arthritis and Musculoskeletal and Skin Diseases (1R01AR081489-01A1)

**Statistical Consultant** 1/2024 – 05/2024

* Applied statistical methodologies includingmixed-effects models to assess survey responses and analysed the impact of a training called “Using Storybooks to Teach Children and Adults About Alzheimer’s Disease” organised by Montana State University Extension under the direction of my collaborators.
* Clearly communicated statistical methods and findings to clients which ensured transparency and lead to informed decisions for program recommendations and development.

**KPMG, Australia (Virtual)** 7/2020 – 8/2020

**Data Analytics Intern**

* Identified data quality issues with the dataset presented by the Sprocket Central company and created visualizations to

help the company better understand its customers.

* Used RMF (Recency, Frequency & Monetary) analysis to help the company determine which customers it should target to increase its revenue (by about 15%) and customer lifetime value.

**TEACHING**

**Montana State University, Bozeman (MSU), MT**

**Graduate Teaching Assistant** 08/2022 - present

* Provided instruction on data wrangling, visualization, and hypothesis testing while guiding students to perform statistical analysis and derive data-driven conclusions.
* Collaborated with students during lab sessions and office hours to clarify statistical concepts and guide effective use of R programming for assignments and projects.

**Course Assistant**

Spring 2025 – STAT 337 (Intermediate Statistics with Computing)

Fall 2024 – STAT 337 (Intermediate Statistics with Computing)

Fall 2023 – STAT 337 (Intermediate Statistics with Computing)

Spring 2023 – STAT 216 (Introduction to Statistics)

Fall 2022 – STAT 216 (Introduction to Statistics)

**Instructor**

Summer 2024 – STAT 216 (Introduction to Statistics)

**Tutor**

Fall 2022 – Math and Stat learning center (MSC)

**Kwame Nkrumah University of Science and Technology (KNUST), Kumasi, Ghana**

**Undergraduate Teaching Assistant** 10/2021 – 07/2022

Spring 2022 – STAT 371 (Regression Analysis)

Fall 2021 – STAT 153 (Statistical Methods I)

**AWARDS AND SCHOLARSHIPS**

Full PhD assistantship award, Department of Mathematical Sciences, MSU 08/2024

Master of Science in Statistics, Montana State University 05/2024

Fee waiver scholarship, Department of Mathematical Sciences, MSU 02/2024

Full MS assistantship award, Department of Mathematical Sciences, MSU 08/2022

Academic excellence scholarship recipient, Ghana Scholarship Secretariat 05/2021

**VOLUNTEERING & LEADERSHIP**

Student mentor, Actuarial Science Student Association, KNUST chapter 09/2019 – 05/2021

Judicial Committee Chair, Actuarial Science Student Association, KNUST chapter 09/2020 – 08/2021

Deputy Finance Chair, Actuarial Science Student Association of Ghana 09/2019 – 05/2020

**PUBLICATIONS**

**Accepted and published**

Modeling of the Daily Dynamics in Bike Rental System Using Weather and CalendarConditions: 06/2024

A Semi-Parametric Approach

* Proposed a robust method using penalized splines quasi-Poisson regression to model bike rentals, revealing hidden relationships not identified by traditional parametric models which informed future transportation strategies.

Predictive Analysis of Misuse of Alcohol and Drugs using Machine Learning Algorithms: The Case of using an Imbalanced Dataset from South Africa 03/2024

* Compared six supervised machine learning algorithms to predict alcohol and drug abuse across South Africa's nine provinces and proposed an optimal predictive model.

**Under Review**

Chondrocytes Embedded in Agarose Generate Distinct Metabolic Heat Profiles Based on Media Carbon Sources

* Determined if three-dimensionally encapsulated chondrocytes are capable of heat production toward improving knowledge of chondrocytes central metabolism.

**CERTIFICATIONS**

Biomedical Responsible Conduct of Research Course, CITI Program 01/2024

IRB Social and Behavioral Research, CITI Program 01/2024

Git, Simplilearn 11/2023 Data Visualization in R with ggplot2, LinkedIn 11/2021

The Data Scientist’s Toolbox, Coursera 03/2021

SQL for Data Science, Coursera 12/2020

Excel/VBA for Creative Problem Solving, Part 1, Coursera 11/2020

Python Data Structures, Coursera 11/2020

Programming for Everybody, Getting Started with Python, Coursera 10/2020

**TECHNICAL SKILLS**

**Programming Languages**: R Studio (Markdown, Quarto, Stan, JAGS, Shiny), Python, SAS

**Database**: SQL

**Project Management Tool**: Git/GitHub

**Statistical Methods**: Functional data analysis, Bayesian data analysis, regression modeling, spatial data analysis, experimental design

**PROFESSIONAL AFFILIATIONS & HONOR SOCIETY**

**American Statistical Association**

Member 03/2024

Participant, JSM Diversity Mentoring Program 08/2024

**Royal Statistical Society**

Student member 01/2024

**The Honor Society of Phi Kappa Phi**

Member, Montana State University 01/2024