# SARAH FOBI MENSAH

2-214 Wilson Hall, Department of Mathematical Sciences, Montana State University, Bozeman, MT 59717-2400
nanamafobi98@gmail.com | sfmensah.github.io | linkedin.com/in/sarahfobimensah/

## SUMMARY

Dedicated graduate student in statistics with a strong passion for using advanced statistical techniques to tackle real-world problems and make meaningful contributions across fields like engineering, healthcare, and finance. My expertise lies in applying dimensionality reduction to make complex data more interpretable and easier for analysis. I have gained hands-on experience in research and consulting, working on projects that range from analyzing experimental and survey data to developing predictive models. I am also continuously expanding my knowledge through data science courses, and I am happy to apply these skills to create meaningful, data-driven solutions.

## PROFESSIONAL EXPERIENCE

**Graduate Researcher** August 2024 – present

- Conducted advanced statistical analysis of microcalorimeter data to assess the amount of heat generated by chondrocytes over a 48-hour period.
- Applied a Generalized Least Squares (GLS) model to account for non-constant variance and assess differences in total heat generation between sample groups of cells.
- Supported the project's goal of exploring the relationship between cellular metabolism and cartilage degradation by applying statistical techniques to analyze experimental data and influencing the direction of ongoing research.

**Graduate Research Assistant** December 2023 – May 2024

- Explored dimensionality reduction techniques, including sparse principal component analysis, to improve the interpretability and analysis of high-dimensional metabolomics data in the context of early osteoarthritis diagnosis.
- Investigated the potential of sparse contrastive PCA for reducing the dimensionality of metabolomics data, aiming to make the data more manageable and informative for identifying early molecular markers of osteoarthritis.
- Plan to develop predictive algorithms that could utilize reduced-dimensionality data, with the goal of enabling less invasive diagnostic methods, such as blood-based testing for the early detection of osteoarthritis.

Funded by: National Institute of Arthritis and Musculoskeletal and Skin Diseases (1R01AR081489-01A1)

**Statistical Consultant** January 2024 – May 2024

- Determined the appropriate statistical methodology to assess quantitative survey responses.
- Analysed the effectiveness of storybook-based training on Alzheimer's disease education for children and adults, using a mixed-effects model.
- Provided clear communication of statistical methods to clients which ensured transparency throughout the analysis process and lead to informed decisions for program recommendations and development.

**Research Assistant** October 2021 - July 2022

- Assisted in constructing predictive models using six machine learning algorithms to classify alcohol and drug abuse based on risk factors across South Africa's nine provinces.
- Supported the development and validation of machine learning models to predict alcohol and drug abuse using an imbalanced dataset.

**Data Analytics Intern**
KPMG, Australia July 2020 – August 2020

- Identified data quality issues with the dataset presented by the Sprocket Central company and created visualizations to help the company better understand its customers.
- Analysed the company's dataset using RMF (Recency, Frequency and Monetary) analysis to help the company determine which customers it should target to increase its revenue and customer lifetime value.

## EDUCATION

**Ph.D. Statistics** Expected 2027
Montana State University, Bozeman, MT

**M.S. Statistics**, GPA: 3.89 May 2024
Montana State University, Bozeman, MT

**B.S. Actuarial Science**, GPA: 3.89 September 2021
Kwame Nkrumah University of Science and Technology, Kumasi, Ghana

## TEACHING EXPERIENCE

Graduate Teaching Assistant, Department of Mathematical Sciences, MSU — August 2022 – Present

Courses taught: STAT 216 (Introduction to Statistics), STAT 337 (Intermediate Statistics with R)

- Provide hands-on instruction with R software, teaching data wrangling, visualization, and interpretation, and guided students in performing statistical analysis and drawing data-driven conclusions.

## TECHNICAL SKILLS

**Programming Languages**: R Studio (Markdown, Quarto), Python, SAS
**Database**: SQL
**Project Management Tool**: Git/GitHub
**Machine Learning Methods**: Random Forest, Naive Bayes, Support Vector Machines, Logistic Regression, Artificial Neural Networks, Decision Tree.
**Statistical Methods**: Regression analysis, Bayesian data analysis, Hypothesis testing, Experimental design

## PROFESSIONAL ASSOCIATIONS

Member, American Statistical Association — March 2024 - present
Member, Royal Statistical Society — January 2024 - present

## AWARD/ LEADERSHIP EXPERIENCE

**Scholarship Awardee**, Ghana Scholarship Secretariat — May 2021
**Judicial Committee Chair,** Actuarial Science Students' Association-KNUST Chapter — September 2020 – August 2021
**Deputy Finance Chair,** Actuarial Science Students' Association of Ghana — September 2019 – May 2020

## PUBLICATIONS

Odoom, Christopher, Alexander Boateng, **Sarah Fobi Mensah**, and Daniel Maposa. "Modeling of the Daily Dynamics in Bike Rental System Using Weather and Calendar Conditions: A Semi-Parametric Approach." *Scientific African* (2024): e02211.

- 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.

Boateng, Alexander, Christopher Odoom, Eric Teye Mensah, **Sarah Mensah Fobi**, and Daniel Maposa. "Predictive Analysis of Misuse of Alcohol and Drugs using Machine Learning Algorithms: The Case of using an Imbalanced Dataset from South Africa." *Appl. Math* 17, no. 2 (2023): 261-271.

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