# M.Sc. BSc. Emmanuel Sam

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## PROFILE

Dedicated and results-driven Research Fellow with six years of experience teaching courses at the undergraduate level, currently finishing an innovative Ph.D. project in algorithms and complexity motivated by possible applications in data visualization and network design. Studied the parameterized complexity (PC) of four intractable computational problems, resulting in preprocessing algorithms for solving them efficiently. Published three articles from a study of the stability of Echo State networks and their performance on non-temporal tasks. Supervised 6+ final-year student projects ranging from data analytics to software development focusing on problems arising in industry and academia, with one project leading to over 30% increase in student admissions and another resulting in a more efficient course and exam timetabling.

## RESEARCH INTERESTS

Algorithms, Supervised Learning, Deep Learning, Parameterized Complexity Theory, and Data Visualization

## EDUCATION

**PhD in Computer Science** — **July 2019 – June 2024 (expected)**
*University of Bergen, Bergen, Norway*
*Thesis Title:* *The Parameterized Complexity of the Structure of Lineal Topologies*
*Supervisor:* *Associate Prof. Nello Blaser*

**M.Sc. Information Technology for Management (Distinction)** — **May 2011 – October 2012**
*Coventry University, UK & Ghana Technology University College, Ghana*
*Thesis Title:* *Adoption of M-commerce Services among Merchants in Ghana*
*Supervisor:* *Dr. Francis Omani*

**BSc. Mathematics (Second Class Upper Honours)** — **August 2004 – May 2008**
*Kwame Nkrumah University of Science and Technology, Ghana*
*Thesis Title:* *Statistical Analysis of Sunlight Data*
*Supervisor:* *Dr. Francis T. Oduro*

## GRANTS & AWARDS

- Travel Grant for ACAI 2018**,** European Association for Artificial Intelligence — **August 2018**
- Best Student in Management Information Systems and Information Technology Related Programmes at graduate Level (2011/2012 Academic Year), Ghana Technology University College — **January 2013**

## RESEARCH EXPERIENCE

**Research Fellow** — **July 2019 – July 2023**
*University of Bergen, Bergen, Norway*
*Supervisor:* *Associate Prof. Nello Blaser*
- Investigated the parameterized complexity of the problem of computing depth-first spanning trees with specific structural properties of importance in graph drawing, resulting in three research papers in renowned conferences and journals.

**Research Trainee** — **2016 - 2017**
*University of Cape Coast and Academic Without Borders Canada (AWBC)*
*Supervisor:* *Dr. Sebastian Basterrech*
- Investigated the stability and controllability conditions of the Echo State Network model and compared its performance for non-temporal tasks, such as predicting the impact of a post on Facebook, with two popular techniques, namely, Support Vector Regression (SVR) and Adaptive Network Fuzzy Inject System (ANFIS).

**Assistant Statistician** — **December 2010 – May 2011**
*Research & Marketing Services International, Ghana*
- Collaborated with team members to design questionnaires and contributed to the identification of trends, correlations, and patterns in data using regression analysis, time-series analysis, ANOVA, hypothesis testing, etc.

**Research Assistant** — **September 2009 – September/2010**
*Wisconsin International University College, Ghana*
- Collected student data, including attendance and evaluation of teaching, and analyzed them using SPSS, Excel, & VBA, resulting in improved teaching and learning

## PUBLICATIONS

- E. Sam, M. Fellows, F. Rosamond, P. A. Golovach, On the parameterized complexity of the structure of lineal topologies (depth-first spanning trees) of finite graphs: The number of leaves, in: M. Mavronicolas (Ed.), Algorithms and Complexity, Springer International Publishing, Cham, 2023, pp. 353–367.
- E. Sam, B. Bergougnoux, P. A. Golovach, N. Blaser, Kernelization for finding lineal topologies (depth-first spanning trees) with many or few leaves, in: H. Fernau, K. Jansen (Eds.), Fundamentals of Computation Theory, Springer Nature Switzerland, Cham, 2023, pp. 392–405.
- E. Sam, S. Basterrech, P. Kromer, Analysis of the dynamics of the echo state network model using recurrence plot, in: A. Abraham, S. Kovalev, V. Tarassov, V. Snasel, A. Sukhanov (Eds.), Proceedings of the Third International Scientific Conference "Intelligent Information Technologies for Industry" (IITI'18), Springer International Publishing, Cham, 2019, pp. 353–361.
- C. Donkor, E. Sam, S. Basterrech, Analysis of tensor-based image segmentation using echo state networks, in: J. Mazal (Ed.), Modelling and Simulation for Autonomous Systems, Springer International Publishing, Cham, 2019, pp. 490–499.
- E. Sam, S. Yarushev, S. Basterrech, and A. Averkin, Prediction of Facebook Post Metrics using Machine Learning, XXI International Conference on Soft Computing and Measurement (SCM'2018), Saint Petersburg, Russia, May 23 - 25, 2018. Available in arXiv.

## PUBLICATIONS IN PREPARATION

- On the parameterized complexity of the structure of lineal topologies with many or few leaves. with M. Fellows, F. Rosamond, P. A. Golovach, B. Bergougnoux, and N. Blaser
- Well Quasi Ordering of Lineal Topologies of Bounded Height Lineal Topologies with N. Blaser, M. Fellows, and F. Rosamond
- On the parameterized complexity of the structure of lineal topologies of finite graphs: The height. with N. Blaser, M. Fellows, and F. Rosamond

## PRESENATIONS

- On the parameterized complexity of the structure of lineal topologies of finite graphs: The number of leaves
  *CIAC 2023, June 2023*
  *Seminar of the Algorithms Group, UiB, May 2023*
- Kernelization for finding lineal topologies (depth-first spanning trees) with many or few leaves
  *FCT 2023, September 2023*
  *Seminar of the Algorithms Group, UiB, May 2023*
- The Dynamics of Echo State Network (ESN) Model
  *ICT Research School Annual Meeting, October 2021*

## TEACHING & ADVISING EXPERIENCE

**Lecturer | IT & Business Computing** **2012 – 2019**
*Wisconsin International University College, Ghana*

- Principles of Programming & Intermediate Programming with C++ *2015 – 2019*
- Database Systems *2015 – 2017*
- Object Oriented Programming with Java *2012 – 2015*
- Data Structures and Algorithm Development with C++/Java *2012 – 2019*
- Supervising undergraduate Level Projects for final year students *2012 –2019*

**Part-time Lecturer | ICT** **2013 – 2019**
*Radford University College, Ghana*

- Numerical Methods *2013 - 2016*
- Probability & Statistics *2013 - 2018*
- Data Structures & Algorithms *2014 - 2019*

**Part-time Lecturer | Faculty of Informatics** **2014 – 2016**
*Ghana Technology University College, Ghana & Staffordshire University, UK*

- Advanced Java Technologies
- Object Oriented Application Engineering

**Teaching Assistant | Business Computing Department** **2008 – 2009**
*Wisconsin International University College, Ghana.*

- Provided instructional assistance to students with challenges in Object Oriented Programming with Visual Basic and Quantitative methods I & II

## UNIVERSITY SERVICE

**FPT Newsletter Reporter** **2019**
*University of Bergen, Bergen, Norway*

- Conducted in-depth interviews with the PC community members at conferences and workshops to gather news for FPT Newsletter.

**Project coordinator** **2014 - 2019**
*Wisconsin International University College, Ghana*

- Oversaw the implementation of the university's student information and library management systems.
- Led a project to fine-tune Open Course Timetabler (an open-source timetabling application) to suit the university's timetabling needs and managed the timetabling process, streamlining the processes related to courses and exams timetables.
- Provided guidance on the selection of project topics, research methodologies, proposal writing, etc.
- Set and reviewed criteria for project assessment and evaluation.
- Managed the relationship between students and advisors, and organized presentations.

## MEMBERSHIPS

- NORA (Norwegian AI Research Consortium) School **2022**
- University of Bergen ICT Research School **2019**
- IEEE Membership (# 94836352) **2018**
- IEEE Computational Intelligence Society Membership **2018**

## TRAINING

**Google Business Intelligence Certificate** **10th October 2023**
*Coursera, online*

**Collaborative scientific software development** **5th July 2022**
*National Research School in Bioinformatics, Biostatistics, and Systems Biology (NORBIS), University of Bergen, Norway.*

**PhD Seminars on writing, searching & data management** **10th June 2022**
*Bergen University Library, Mathematics and Natural Sciences Library, and the Faculty of Mathematics and Natural Sciences, University of Bergen, Norway.*

**Advanced Course on Artificial Intelligence (ACAI) 2018:** **27th Aug. 2018 -31st Aug. 2018**
**Statistical Relational Artificial Intelligence**
*University of Ferrara, Ferrara, Italy*
*Sponsors:* *European Association for Artificial Intelligence*
*Contact* *Fabrizio Riguzzi, fabrizio.riguzzi@unife.it*

**Computer Science Seminars of Academic Without Borders, Canada (AWBC)** **2014 – 2017**
*University of Cape Coast, Ghana*
*Contact:* *Dominique Soutteau, dominique.sotteau@okofoto.com*

## TECHNICAL SKILLS

- Statistical and machine learning techniques
- Algorithm design and Analysis, and complexity theory
- Adept in data cleaning, transformation, and ensuring data integrity using SQL and Python libraries (e.g., Pandas).
- Data visualization and proficiency in tools like Tableau, Matplotlib, MS Excel and VBA.
- Data modelling, ETL, Database and Data warehouse design with MS SQL server, SSIS, DataFlow, and BigQuery.
- Proficiency in Programming with Python, Java, C++, and Visual Basic.Net.
- Proficiency in SPSS and R
- Good knowledge of Web Development: XML, HTML5, JavaSript, and ASP.Net

## LANGUAGES

- English Fluent
- Norwegian Basic
- Akan Native

**REFERENCES**


- Nello Blaser
  Associate Professor of Machine Learning
  Department of Informatics
  University of Bergen
  *nello.blaser@uib.no*
- Michael Fellows
  Professor of Algorithms
  Department of Informatics
  University of Bergen
  *michael.fellows@uib.no*
- Sebastian Basterrech
  Postdoc
  Department of Applied Mathematics and Computer Science,
  Danmarks Tekniske Universitet
  *sebbas@dtu.dk*