



Highlights

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Student updates

The January and August intake students completed the following courses: Introduction to Random Systems, Information Theory, and related topics (Stéphane Ouvry, Université Paris Sud); Networks (Phil Knight, University of Strathclyde); Introduction to Multiscale Models and their Analysis (Jacek Banasiak, University of Pretoria); Analytical Techniques in Mathematical Biology (Lyndsay Kerr, Edinburgh University); Computational Algebra (Wolfram Decker and Gerhard Pfister, TU Kaiserslautern); Fluid Dynamics (Grae Worster, University of Cambridge and Richard Katz, University of Oxford); Probability and Statistics (Daniel Nickelsen, AIMS South

Africa); Biophysics at the Microscale (Daisuke Takagi, University of Hawaii at Manoa); Symmetry Analysis of Differential Equations (Masood Khalique, North-West University); and Distributed Systems (Jeff Sanders, AIMS South Africa).



August 2020 Intake



January 2021 Intake

Deep Learning IndabaX Gambia 2021

The Gambia Deep Learning INDABAX (DLIX) 2021, held in The Gambia from 27-29 May 2021, was one of more than 25 such events that will be held in 2021 across the African continent that are supported by the main Deep Learning Indaba. The Deep Learning Indaba exists to celebrate and strengthen machine learning in Africa. It works towards the vision of Africans becoming critical contributors, owners, and shapers of the coming advances in artificial intelligence (AI), data science (DS) and machine learning (ML). The IndabaX in The Gambia boosted interest in, and building a community around, AI/ML/DS for university STEM students and interested industry practitioners. It was also an event that created awareness about the exciting developments and tremendous potential of AI/DS/ML for stakeholders in both public and private sectors of The Gambia.



Dr Bah giving a statement at the IndabaX-Gambia opening

This was the second DLIX The Gambia, the first was successfully held at the University of The Gambia in May 2019, and trained 50 students. The theme of this year's DLIX was "Application of Deep Learning to Health Care Delivery". Participants were trained on state-of-the-art algorithms for AI/ML/DS. There were also talks on the applica-



Participants of the beginner class in the Deep Learning IndabaX-Gambia led by Mr Rockefeller



Presentation on Linear regression for the intermediate class of the Deep Learning IndabaX-Gambia by Dr Bah

tions of these algorithms to health problems.

Dr Bubacarr Bah was an organiser and speaker at the event. Mr Samuel Ofori Mensah and Mr Rockefeller were teaching assistants.

Images © <https://twitter.com/deepindaba>

Research News

AIMS-GPSDD Data Science Fellowship Programme

AIMS in partnership with GPSDD implemented a Data Science Fellowship Programme. The programme was delivered through 4-week modular training sessions for government officials from selected National Statistics Offices and other key government institutions across Africa and an internship programme where an AIMS alumnus was embedded in the partner institutions to build and enhance capacity and as well as provide mentorship in the area of data science.

The objective of the AIMS-GPSDD Data Science Fellowship programme is to strengthen the skills and capacity of the host institutions to use data science

tools and its analytical capabilities in enhancing data and statistical processes and outcomes.

Dr Bubacarr Bah, the German Research Chair of Mathematics with specialization in Data Science, who heads up the Data Science Group in the AIMS Research Centre, was a trainer in the training programme and is currently a supervisor loosely supporting the fellows attached to National Statistics Bureaus. Two other members of the Data Science Research Group, Mr Samuel Ofose Mensah and Mr Rockefeller were teaching assistants and are also part of the support team for the fellows.

AIMS Doctoral Training Programme in Data Science

The field of data science is emerging as a critical discipline with high relevance to economic growth and development. This [doctoral training programme](#) established by AIMS will provide emerging African scientists the opportunity to conduct research at the forefront of data science, and work towards a PhD degree within a high-quality training program in Africa, in cooperation with institutions internationally.

This programme is part of the training offered [Quantam Leap](#)

[Africa \(QLA\)](#) which was created by AIMS to catalyze top quality high impact research in data science, smart systems engineering and drive the future IT revolution through quantum information. It is also mandated to train the next generation of innovators in information science and technology.

Dr Bubacarr Bah, was involved in setting up this programme and is one of the [board](#) members overseeing it.

Baden-Württemberg Africa Science Collaboration Conference

This virtual conference was held online on 20 and 21 April 2021. The workshop discussed the digitalization of health in the African context. Presentations included focused overviews of digitalization and related activities in the wake of COVID-19 in Rwanda, in the West African sub-region and in Africa at large; data science and Artificial Intelligence (AI) digital products and decision

support for health digitalization; and mathematical sciences research support in COVID-19 testing.

Dr Bubacarr Bah was a panelist on a panel discussing the topic 'How can digitalization contribute to a more resilient global health?' He also organised one of the workshops on the topic: 'Research informed decision making in digitalisation of health'.

Cosmology Group Updates

Prof. Bruce Bassett, Head of the Cosmology Group, was one of about 30 invited international guests at the inaugural NASA Strategic Data Management AI workshop which took place from 12 to 14 May 2021.

The workshop covered a wide range of AI and Data Science topics including identifications of gaps in NASA's capabilities around data, models and cross-divisional implementation of AI.

Research Talks

Dr Marc Sedjro, German Research Chair for Applied Mathematics with specialization in Partial Differential Equations and Calculus of Variations gave two online talks on how hyperbolic conservation

laws can provide some insight into understanding Mean Field Games. The first was for Hampton University on 23 April and the second was for AIMS Ghana on 6 May 2021.

Financial Mathematics Webinars

The Financial Mathematics Research Group hosted two webinars:



On 29 April, Dr Jules Mba, University of Johannesburg, gave a talk titled: 'Cryptoassets

portfolio selection and optimization'.



On 27 May, Dr Rodwell Kufakunesu, Snr Lecturer, Department of Mathematics and Applied Mathe-

matics, University of Pretoria, gave a talk titled: 'Quanto Commodity Options.'

Journal Club

On 25 May 2021, Dr Emmanuel Dufourq (AIMS South Africa) gave a presentation in the Journal Club on using

pre-trained neural networks for monitoring endangered species with few samples.

The screenshot shows a presentation slide titled 'Hainan gibbons'. On the left is a photo of a gibbon. On the right is a flowchart of a neural network architecture. The flowchart starts with 'Input: spectrogram with size (128x128x1)', followed by 'Conv2D: 8 filters of size 16x16, ReLU activation', 'MaxPool2D: size of 4x4', 'Conv2D: 8 filters of size 16x16, ReLU activation', 'MaxPool2D: size of 4x4', 'Conv2D: 8 filters of size 16x16, ReLU activation', 'MaxPool2D: size of 4x4', 'Dense: 32 units, ReLU activation', 'Dense: 2 units, softmax activation'. Below the flowchart, it says 'Number of networks explored', 'Best performing one shown here', and '24K network parameters'. On the right side of the slide, there is a list of participants: 'Participants attending the Journal Club online'.

Participants attending the Journal Club online

House of Science Updates

South African Scientists & Science Festivals: Challenges and Transformative Scenarios for Engagement

The recent decade has seen the proliferation of the 'public engagement' agenda and the calls for actions from various governments and scientific institutions for scientists to engage with the broader society across a range of platforms as reflected in the science-policy frameworks, both in [Africa](#) and globally. For the [Department of Science and Innovation Science Engagement Strategy](#) and the [2019 White Paper on Science, Technology and Innovation](#), public science engagement in South Africa is positioned as a mandatory activity for scientists and organisations that receive public funding.

But what are the factors that motivate and/or deter scientists' interest and willingness to participate in Science Engagement activities such as science festivals?

While numerous studies that address this question were done almost exclusively in the developed world, little attention has been paid to scientists in the developing world. That said, the global studies on the public communication behaviour of scientists may provide valuable insights that are also applicable to the local context. Nevertheless, it has been

shown that there are country-specific science communication challenges and barriers that may influence scientists to engage with the broader society.

The recently published paper on [Why scientists agree to participate in science festivals: Evidence from South Africa](#) provides practical insights into country-specific motivations for scientists to engage with a diverse range of audience in South Africa's annual national science festival, Scifest Africa. Forty scientists who participated in the science festival in 2019 were surveyed. The research findings showed that objectives of informing, exciting and inspiring the public were key motivators. Furthermore, additional factors linked to the legacy of apartheid in South Africa and current growing societal challenges inspired a strong moral obligation amongst most scientists to give something back to society through inclusive platforms such as the Scifest Africa. In particular, for black African and/or female scientists, being role models was a key motivating factor.

Please click [here](#) for more information.

AIMS House of Science Attended the National Science Week 2021 Briefing Workshop

AIMS House of Science Manager Dr Rejoyce Gavhi-Molefe represented AIMS during the National Science Week (NSW) 2021 planning virtual meeting that took place on 7 April 2021. The goal of the meeting was to brief different role players and stakeholders on the implementation and activities expected of them during NSW.

The NSW is an annual celebration of science, technology, and engineering organised by the

Department of Science and Innovation (DSI) to provide an opportunity for the general public to celebrate the importance of science and technology in their lives. Thereby creating a society that is knowledgeable about science. NSW 2021 (hybrid in nature) will take place from 1 to 7 August throughout the country. The adopted NSW scientific theme for 2021 is "Making it possible through science".

AIMS Gender in STEM: Mental Health and Wellness: Personal, Professional & Growth

On 21 and 23 April, AIMS House of Science hosted Mentoring online sessions (one for females and the other males) under the theme - Mental Health and Wellness: Personal, Professional Growth - as part of the AIMS Gender in STEM inHouse programme. The sessions provided an enabling environment for discussions concerning the challenging realities that are experienced by AIMS students with regards to mental health and well-being. Such realities remain part of topical issues during the ongoing COVID-19 global pandemic.

The sessions featured six speakers/mentors (AIMS alumni and researchers) currently pursuing different career paths in academia and other sectors. During the webinars, the speakers shared their personal experiences, strategies and techniques they adopted to manage mental health and well-being issues, work-life balance during their career journeys. Furthermore, they shared tips on

how students can become resilient and productive during AIMS training, especially at the time of the COVID-19 era, given the intensity of the AIMS programme. They also encouraged students to seek help and make use of the AIMS community and resources available to support them.

The session on 21 April was attended by female students only. The mentors were Ms Jessica Phalafala, a Quantitative Analyst and PhD student at the Prescient Investment Management and Data Science at AIMS South Africa, respectively; Ms Tshenolo Dumas, an MSc student in Deep Learning Application in Bioinformatics at AIMS South Africa; Ms Kelebogile Baliki, a Data Analyst Intern at the Okavango Diamond Company, Botswana. The session on 23 April was specifically for male students. The mentors were Dr Rock Stephane Koffi, Analyst at the Elenjical Solutions, South Africa; Mr Rockefeller, PhD Candidate in Data Science, AIMS South Africa; and Dr Dennis Ikpe, Researcher in Mathematical Finance, University of Michigan, United States.



Ms Phalafala



Ms Dumas



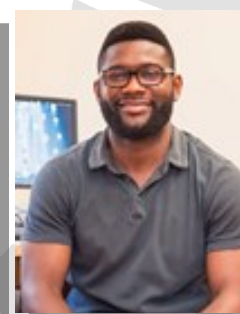
Ms Baliki



Dr Koffi



Mr Rockefeller



Dr Ikpe

Après-Lunches with Mathematical Scientists

The House of Science programme continues to create a conducive environment for students, researchers and mathematics devotees to interact with esteemed mathematical scientists/role models working in academia/industry and other sectors. The Après-Lunch webinars thus enable graduate students to meet potential mentors in their academic career and foster collaboration amongst the researchers.

The theme of the April 2021 Après Lunch webinars was "Career Advancement in Mathematical Sciences in Africa". The webinars discussed the challenging realities experienced by Mathematical graduates and career opportunities in Financial Mathematics, Biomathematics and Biostatistics - some of the most attractive, rapidly evolving and fascinating disciplines. The webinars featured speakers working in Africa or/and abroad.



On 8 April, the webinar featured Dr Mesias Alfeus, who completed a BSc Honours at AIMS

South Africa in 2013. Dr Alfeus is a Financial Risk Management Lecturer at Stellenbosch University in South Africa. He obtained a PhD in Quantitative Finance from the University of Technology Sydney (UTS) in Australia, with a dissertation entitled "Stochastic Modelling of New Phenomena in Financial Markets". His current research interests focus on Computational and Mathematical Finance. It (the research) is more specifically in numerical methods for pricing of

options and model calibration including model empirical analysis. Dr Alfeus shared his career journey in mathematics from the humble beginnings, the challenges he encountered and the experiences he gained.



On 22 April, the webinar featured Dr Abdul-Karim Iddrisu and Dr Jude Dzevela Kong. The former is an AIMS South Africa alumnus from the class of 2011/2012. He is a Lecturer at the



University of Energy and Natural Resources in Ghana. He obtained his PhD in Statistical Sciences from the University of Cape Town in South Africa. His research focuses on developing statistical methods that are motivated by the issues arising in clinical and health research. From 2 August 2021, he will be starting his new job as a Biostatistician at Synterac in South Africa. The latter, Dr Kong, is a Professor in the Department of Mathematics and Statistics at York University in Canada. He is also a Director of the Africa-Canada Artificial Intelligence and Data Innovation Consortium (ACADIC) at York University. His principal research objective is to use mathematical/statistical modelling to study the impact of environmental stressors on species distribution and the dynamics of infectious diseases. Apart from his academic role, Dr Kong provides mentorship to aspirational scientists to navigate their career progression.

Click [here](#) for the full article.

Village Science & Technology Expo: AIMS House of Science Highlights Career Opportunities in Mathematical Sciences

On 11 May, AIMS House of Science contributed to the 2021 Village Science and Technology (S&T) Festival held at Vuwani Village [in the Limpopo province of South Africa] with the talk on Career Opportunities in Mathematics. The 3-day festival - a hybrid in nature - took place from 10 to 12 May. Rivoningo Foundation organised it in partnership with the Limpopo Department of Education and SAASTA. It has attracted more than 1500 students from various schools across Vhembe District. The festival aimed to nurture the creative talent of the learners and create interest in learners to pursue STEM-related careers. It also aimed to reach the neglected learners and teachers in rural communities in Vhembe District. The festival programme was jam-packed with exhibitions, special talks on STEM subjects by scientists and hands-on activities.

Dr Mpfareleni Rejoyce Gavhi-Molefe, the House of Science Manager, shared the students' challenges and opportunities with regard to mathematical sciences careers and the various aspects that students

should consider before embarking on a post-High School journey in STEM fields. She also shared her inspiring story as a mathematical scientist from a Khalavha Village in Limpopo Province. She gave insight into how school-level mathematics such as algebra and trigonometry and university mathematics are used to advance animation or help make more human-like characters and special effects in the film industry such as PIXAR Animation Studios.

It is without a doubt that the COVID-19 global pandemic is deepening perpetual educational inequality in our country. Now more than ever, learners in historically disadvantaged communities such as rural areas need support. Public engagement platforms such as Village S&T Festival provide a unique opportunity for those learners to interact with role models in STEM and learn about career opportunities. By sharing our stories, achievements and obstacles as scientists, we may also give hope to those learners and kindle their interest in pursuing STEM career-related during this unprecedented period in our lifetime.

Announcements

HOUSE OF SCIENCE
WEBCAST SERIES
Après-Lunch with Mathematical Scientists
10 JUNE 2021 | 13:45 SAST

Mr Robert Ramapulana Motala
Software Engineer, Founder & Managing Director, ERRACO, South Africa

Prof Edson Pindza,
Applied Mathematician, Founder & CEO, ECCENSCIA PTY LTD, South Africa

RSVP: <https://forms.gle/dEh6S2kZ9Rofa27>
Question? Email houseofscience@aims.ac.za
@AIMS_Next @AIMSsaza #AIMSHouseOfScience

Africa Scientifique
Leadership, Knowledge & Skills
For Science Communication
Introduction to Programme
Growing Africa's Capacity for
Science Communication Impact
24 JUNE 2021 | 13:45-14:45 SAST

Dr Rejoyce Gavhi-Molefe
House of Science Manager, AIMS South Africa

Dr Elizabeth Rasekoala
President: African Gong

RSVP link: <https://forms.gle/d4ISNZ5e5iYDy1t8>
Question? Email Dr Rejoyce Gavhi-Molefe at rejoyce@aims.ac.za

