REPUBLIQUE DU SENEGAL

MINISTERE DE L'ENSEIGNEMENT SUPERIEUR
DE LA RECHERCHE, ET DE L'INNOVATION

AIMS | African Institute for Mathematical Sciences | SENEGAL

AIMS SENEGAL

ANNUAL

REPORT 2021 - 2022

AIMS - SENEGAL

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Who we are ?

African Institute for Mathematical Sciences in Senegal (AIMS - Senegal) is a pan-African non-profit institute which aims at contributing to the development of Africa through training, research, innovation and public engagement in mathematical sciences and its applications. The institute is authorized by decree 2011 - 1030 of July 25, 2011 of the Ministry of Higher Education, Research, and Innovation as a private higher education institution recognized by the Ministry of Economy and Finance as a Public Utility entity under the T.I.N : 44209230X0, and recently accredited by ANAQ Sup for its quality and innovative teaching

AIMS Senegal is part of the Next Einstein Initiative (AIMS-NEI), a network of centers of excellence designed to identify and train Africa's best scientists as a means of contributing to the continent's development. Students, selected from among the best on the African continent, benefit from full support in the form of a monthly stipend, accommodation, catering and close interaction with full-time tutors and professors from all over the world.

Over the past twelve years, AIMS Senegal has trained over 700 students (many of whom are women) equipped with the knowledge and know-how to solve mathematical problems in certain key areas of development. Coming from 20 African countries, these students have specialized in fields such as computer security, big data, artificial intelligence and climate science.

Students are trained to apply mathematical problem-solving approach to key areas of development, including finance, health, agriculture, food security, energy, mathematical modeling applied to natural resources and infrastructure. In Senegal, for example, students have been trained in mathematical and computer modeling applied to fisheries, to improve productivity in the fishing industry.

Word from the centre President

At AIMS Senegal, you are not alone!

By choosing AIMS Senegal, the students enter a stimulating living environment for the development of their knowledge, personal qualities as well as their professional skills that will allow them to build a career and meet great challenges. A higher education institution, such as AIMS Senegal, is a hotbed of innovations, both technological and social, and existing projects aimed at propelling Africa's future scientific, educational and economic self- sufficiency to make it more sustainable, healthier and fairer. We invite them to get involved, to participate in academic and extra-academic activities, to take full advantage of their stay with us, in a responsible way.

On behalf of the President of AIMS-Senegal and the entire staff, I welcome you to this prestigious AIMS community and wish you every success in your studies and a stay filled with happiness and great stories to tell for decades to come.

The operations management team will be at your side, providing unfailing support to ensure that AIMS is no different from your loving homes. Competent and dedicated men and women will accompany you from the heart throughout your educational trajectory at AIMS-Senegal. Allow me to salute their professionalism, which is matched only by the vision of President Moustapha FALL.

Be respectful, be attentive, be studious and be happy as ever!

Dr. Elhadji Thierno Gueye
Chief Operating Officer

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INTRODUCTION

The African Institute for Mathematical Sciences (AIMS) is a pan-African network of Centres of Excellence for postgraduate training in mathematical sciences, research, and public engagement in Science, Technology, Engineering, and Mathematics. Founded in 2003 in South Africa by acclaimed physicist Prof Neil Turok and later replicated in Senegal, Ghana, Cameroon and Rwanda, AIMS is leading Africa's socio-economic transformation through:

• Innovative scientific training (the development of human capital);

• Technological advances and cutting-edge scientific discoveries; and

• Public engagement for the continent's scientific development.

Africa's youth are at the heart of the AIMS innovation and transformation ecosystem which consists of a set of academic and non-academic programs expertly tailored to provide AIMS learners with a unique postgraduate training experience on the continent.

AIMS Senegal offers a Master's in mathematical sciences with 3 option:

- **Regular Program:**

AIMS Senegal offers an intensive 10-month training program leading to a master's degree in mathematical sciences, This program takes place over 3 semesters.

Semester 1 dedicated to skills courses

Semester 2 for course reviews

Semester 3 for the preparation of thesis subjects and the oral defense.

The goal of this program is to develop well-rounded scientists with excellent problem-solving skills, capable of creative thinking and true innovation; and to equip students with the tools and confidence for decision- making and policy analysis; and opening up postgraduate research opportunities around the world.

- **Coop-program** :

This program was developed, tested and piloted by AIMS Senegal in 2015. Thanks to the success and the results recorded, it has been replicated in other centers (Rwanda, Cameroon, etc.).

Building on the regular Masters, it is a work-integrated learning model that promotes a strong transition to meaningful employment for students by enriching their learning experience through the acquisition of relevant skills. It is structured over 18 months, including a 10-month course, 6 months of professional internship and 2 months of writing the master's thesis subject.

- **AMMI :**

AIMS Senegal has been hosting the AMMI (African Masters in Machine Intelligence) program for 3 years. It is an intensive one-year Masters program fully funded by our partners Google, Facebook and AIMS NEI which provides bright young African talents with cutting-edge training in machine learning and its applications.

Our former Co-op and regular students integrate this program to reinforce their knowledge already acquired on the concepts of Data sciences, Machine Learning and Artificial Intelligence.

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AIMS offers a Master's in mathematical sciences, including a co-operative option with a direct link to industry, the African Master's in Machine Intelligence (AMMI), as well as research programs, with over 100 researchers conducting studies across the network. In addition to the AIMS Industry Initiative and a gender-responsive Teacher Training Program currently implemented in Cameroon and Rwanda, AIMS equally created two critical initiatives: Quantum Leap Africa, a think tank looking into the coming quantum revolution and the Next Einstein Forum to propel Africa on to the global scientific stage.

OUR CORE VALUES

Excellence

Pan-Africanism

Respect

Integrity

Vision

To lead the transformation of Africa through innovative scientific training, technical advances & breakthrough discoveries which benefit the whole of society.

Vision & Mission

Mission

To enable Africa's brightest students to flourish as independent thinkers, problem solvers & innovators capable of propelling Africa's future scientific, educational & economic self-sufficiency.

HIGHLIGHT

Key Achievements

Accreditation Anaq Sup (National authority for quality assurance of higher education, research and innovation)

84 Master students graduates with over 40% femeles

Signature of ONFP (National Office for Professional Training**) agreement**

Schools and Conferences organized

Signature of LIMSAD (Laboratory of Computer Science and Modeling of Decision Support System**) agreement**

AIMS Senegal, 10 years celebrated

Signature of agreement with 3 industries partners

Signing of Haskee Ventures agreement

Signing Geomatica agreement

Signing of the ICRISA agreement

Launch of the AMMI (African Master's in Machine Intelligence)

The Academic year began on October 10, 2021.

● the Cooperative Master Program with 20 students from 10 African countries including 12 women (35%) and 59% Senegalese. Most of the co-op students were selected after an interview (conducted on zoom or google meet).

● The regular Master with 45 students, 50% of whom are women.

● AIMS Senegal hosted for the second time the African Master in Machine Intelligence (AMMI) program with 35 students.

● The 2020-2021 coop students who finished their internship in November and back to the center to work on their research project.

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New Academic Manager
Dr. **Coura Balde**

She is one of the second cohort students with a fully funded PhD project in the Non-Linear Analysis, Geometry and Applications (NLAGA SIMONS) Project led by Pr. Diaraf Seck.

Her research interest is diverse but she mainly focuses on using dynamical system theory, integro differential equations and machine learning technics to tackle questions related to recurrent infectious disease, population resources conflict, parameter sensitivity analysis with a focus on improving modeling technics as a tool for public health policy makers.

She coauthored papers with members from LMDAN lab in the project of Understanding and fitting COVID-19 pandemic. She recently started a research collaboration on resources conflict with Prof Agostino Merico, Work Group Leader, Professor for Ecological Modelling, Constructor University. She is also the secretary general of Senegalese Woman in Mathematies Association (SWMA).
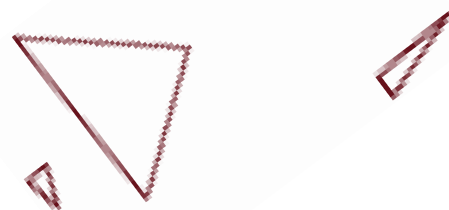
Teaching at
AIMS SENEGAL

AIMS tuition, study materials and housing are fully funded through a generous scholarship. AIMS' residential model allows more contact time between lecturers and students than in a typical university setting. Students study two subjects for three weeks each, with each day comprising morning lectures followed by problem-solving and computing sessions each afternoon.

Additional tutorials and special lectures are held in the evenings in order to allow students to complete their assignments.

With outstanding visiting lecturers from renowned institutions and laboratories worldwide, the courses are broad in scope and employ the latest pedagogical methods to stimulate critical and creative thinking. To facilitate student participation and follow-up, each centre offers a Tutoring Fellowship, which allows Postdoc and doctorate researchers to work as dedicated teaching assistants, providing capacity building for the students 24/7. The institute's unique residential character allows for optimum interaction between students, lecturers, and tutors in a harmonious environment at all hours.

Some of our Faculties

Prof **Ndeye Niang Keita** from
CNAM, France
Visiting Lecturer for the data mining and big data Analytic course at AIMS SN.

Ndeye Niang Keita is Associate Professor in data analysis at CNAM, member of the MSDMA research team "Statistical Methods for Data Mining and Learning" at CEDRIC (Centre de Recherches en Informatique et Communication) and senior lecturer at Institut de Statistique de l'Université Paris VI (ISUP). She earned a BSc in Mathematics, MSc. in Applied Mathematics, MSc. in Computational Methods and Mathematical Models from the University Paul Sabatier Toulouse. She has a PhD in Statistics from the University of Paris IX Dauphine.

« I think that AIMS is a great institution born out of a very well-thought and ambitious project for Africa, putting science at the heart of its development.
From my point of view, AIMS-Senegal ensures significant human resources (teachers, tutors, and other staff) and logistics (room, internet, computer, connection...student residence...) are available to guaranty the better conditions for student success.
I appreciate the collaboration with the management and the academic team (who are very attentive to my remarks and criticisms) for the definition and regular updating of the content and formats of the lessons and research projects with the aim of making them as effective as possible. This allows for an innovative pedagogy characterized by close relationships between teaching (and administrative) staff and students and a particular relationship to assessment through the grading system. All this is a testimony of the consolidation of my collaboration and my support for AIMS ».

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Prof. Marie Postel

Marie Postel (ECP 1985, Doctor of Engineering ECP 1987) joined the Jacques-Louis Lions Laboratory in 1991 after a 3-year post-doctorate at the Courant Institute (New York University). She has been a lecturer in LJLL since 2007 and later a Research supervisor in 2008. She is currently in charge of the Master's degree in Mathematical Engineering at the Sorbonne University.

Marie Postel has extensive experience in teaching numerical and optimization methods and has set up a network of relationships with companies to offer students internships in industry. Her current research interests focus on the mathematical modeling of biological systems.

This is my third year teaching at AIMS Mbour Senegal as part of a collaboration between AIMS and my university (Sorbonne University, Paris, France).

It is always a pleasure to participate to this Master program. The students are selected from all over Africa therefore classes are held in English. The motivation of the students of this institute is very high, they are subjected during their year in Mbour to an intensive rhythm of courses and projects. There is a good deal of interaction between students, which even extends to meal time where students, lecturers, and staff discuss. The spirit is really good, focused but with some more relaxed sessions, like seminars and sport.

Prof. Des Johnston

After growing up in Belfast, Northern Ireland and studying natural science at Trinity College, Cambridge, Des Johnston earned a PhD in theoretical physics from Imperial College London in 1986. He then worked as a post-doc at LPTHE Orsay , Uni Paris Sud and at Caltech, Pasadena. He was lucky enough to be in Berlin at the Free University for a few months as the Berlin Wall came down in 1989. He was appointed as a lecturer in mathematics at Heriot-Watt University in Edinburgh, Scotland in 1990 and has been there ever since. In 1993-4 he was appointed as a Marie Curie fellow at Orsay and following that he also went for shorter acadmic stays at the Institut Henri Poincaré, the Institut Niels Bohr and Nordita.

The quantum computing course was delivered this year partially online (first half) and partially in person (second half). Interestingly, the majority of students electing to take the course were online this year. The course was assessed with two "take-home" assignments and a timed exam on the final day.

The technical and organizational aspects of the course generally worked well, with the smartboards and audio room being remarkably glitch-free. The assistance of the course tutors was also invaluable.

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Prof. Yaé Ulrich Gaba

Yaé Ulrich Gaba completed his doctoral studies at the University of Cape Town (UCT, South Africa) with specialization in Topology and is presently a research associate at Quantum Leap Africa (QLA, AIMS Rwanda). With a strong passion for computational geometry, applied algebraic topology (topological data analysis), and geometric machine learning (graph and point-cloud representation learning), he has dedicated his research interests to exploring the intersection of these fields. His current focus is on the development of novel geometric methods in data analysis. By harnessing the power of geometric and topological ideas and methods, his work aims at creating effective and theoretically grounded algorithms for data and shape analysis. His research endeavors are driven by the desire to advance our understanding and application of these fundamental mathematical concepts in real-world scenarios, ultimately contributing to the broader field of data science and machine learning.

Experience: During my time as a visiting lecturer and supervisor at AIMS SN, I had a truly fulfilling experience. The opportunity to engage with bright and motivated students in both classroom settings and one-on-one supervisory sessions was immensely rewarding. I found the academic environment at AIMS SN to be stimulating and conducive to fostering intellectual growth. The collaborative nature of the faculty and staff, combined with the dedication of the students, created a vibrant learning community. It was a privilege to contribute to the academic development of the students through lectures, discussions, and providing guidance in their research projects. I also appreciated the support and resources available to me as a visiting lecturer, which enabled me to deliver high-quality instruction and mentorship. Overall, my experience as a visiting lecturer and supervisor at AIMS SN was enriching, and I am grateful for the opportunity to have been part of such a dynamic academic community.
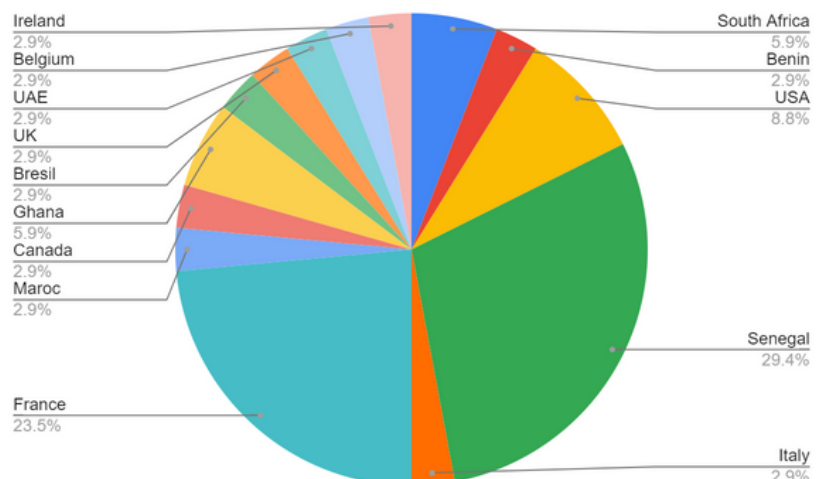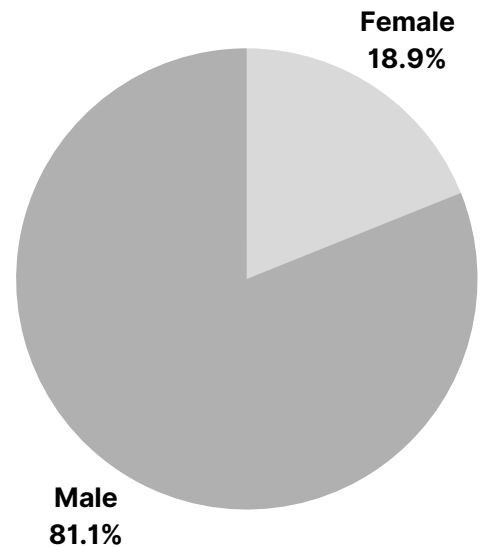
The teaching environment of AIMS is diverse.
This year AIMS had welcome in total 37
Lecturers, dispatched as follow :
- *7 female*
- *30 male*
90% courses was taught physical and 9% in
remote.

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ACADEMIC CALENDAR

Skill Courses		
Block 1 October 11 – October 30	**Block 2** November 01- November 20	**Block 3** November 22 – December11
Course I: Linux + Python (intro to algorithmic) by *Ulrich Yae Gaba*	**Course I:** Introduction to climate science *by Mouhamadou Bamba Sylla*	**Course I:** Differential Calculus and ODE by *Moustapha Sene*
Course II: Mathematical Logic by *Rehana Patel*	**Course II:** Probability and Statistics by *Abdou Ka Diongue*	**Course II:** High dimensional data analysis by *Sophie Dabo Niang*
Course III: Mathematical Problem Solving by *Audace Amen Vioutou Dousou Olory*	**Course III:** Linear algebra and Applications by *Bernadette Faye*	**Course III:** Linear algebra and Applications by *Bernadette Faye*
Course IV: Introduction to Data Science by *Souleymane Ndoye*		**Course IV:** Entrepreneurship and Leadership by *Brice Dier Koue*

Courses of Review phase		
Block 1 February 01 – February 19	**Block 2** February 22 – March 12	**Block 3** March 15 – April 02
Course I: Graph theory and applications by *Rehana Patel*	**Course I:** Numerical Optimization by Marie *Postel*	**Course I:** Data mining and Big Data Analytics by *Ndeye Niang Keita*
Course II: Measure and Integration by *Aliou Diop*		**Course II:** Data Base (SQL, noSQL, Hbase & Security) by M *Mouhamadou Lamine Ba*
Course III: Machine Learning: Supervised and Unsupervised by *Hamilton Wielfrid*	**Course III:** Deep Learning & Neural Network by *Arnaud Zinflou*	**Course III:** Deep Learning & Neural Network by *Arnaud Zinflou*
Course IV: Computer security 1 Networking and Security by *Ousman Ndiaye*	**Course IV:** Computer security 2 Auditing, Computer Forensics and Investigation by *Oumar Diao*	**Course IV:** Reinforcement Learning by *TSOPZE Norber*
	Course V: *Topology and functional Analysis by* **Ngalla Djiite**	**Course V:** Computer Security 3 Ethical Hacking, **Mboup**
Block 4 April 12 – April 30	**Block 5** May 03 – May 21	**Block 6** May 24 – June 11
Course I: Computational Finance with Python by *Conall Kelly & Djiby Fall*	**Course I:** Mathematical Modelling for Climate Change by *Babatunde Joseph Abiodun*	**Course I:** Quantum Mechanics and Quantum Computing by *Des Jonhstone*
Course II: Computer Security 5 by *Moussa Dhiedhiou, Saliou Thiam & Ibrahima DIOP*	**Course II:** Computer Security 4 Mathematical Model for Network Security by *Nandi Leslie*	**Course II:** Big Data 5, Web development and Android by *Abdou khadre Diallo*
Course III: Climate Dynamics by *Mouhamadou Bamba Sylla*	**Course III:** Elliptic Curve and Cryptography by *Djiby Sow*	**Course III:** Bio-Mathematics by *Diene Ngom*
Course IV: Natural Language Processing by *Elvis Ndah*		**Course IV:** Differential Geometry, by **Aissa Wade**

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PUBLIC TALK

This activity aims to bring together researchers, students and lecturers to share their research interest. In 2021-2022 academic year, AIMS Senegal had welcome at least 10 speakers from different countries. Let's highlight some of them.

Date	Names	Affiliation	Talk title
October 27, 2021	Dr Audace Amen V. Dossou-Olory	AIMS South Africa	On the extremal leaf-induced densities of a rooted tree
	Dr Yae Ulrich Gaba	IMSP Benin & AIMS Rwanda	Manifold learning
29 January ,2022	Dr Coura Baldé	AIMS Sénégal	Graph theory and application in epidemiology
Mars 30, 2022	Lema legamou	AIMS Sénégal	Monte Carlo integration using pseudo-random numbers from LCG, Comparison to the uniform distribution
Feb 03, 2022	Papa Ngor Ndiaye	chief officer in prevision and risk reduction at the ANACIM (Agency for Civil Aviation and Meteorology)	Tropical meteorology
May 27,2022	Dr. Ramsès Djidjou-Demasse	IRD, France	The dynamics of adaptation

My Teaching experience at AIMS Senegal
My teaching experience at AIMS Senegal has contributed to my ability to effectively deliver a course material and engage with students. The teaching was interactive, the learning environment encourages active participation of the students. The course on Mathematical Problem Solving enables students to see the relevance of mathematics in solving real-world problems. It encourages students to work together, exchange ideas, and engage in group projects.
In addition to teaching the course, I am also involved in mentoring students and supervising research projects.

Dr. Dossou-Olory also holds a Design Engineering Diploma in Electrical Engineering from Ecole Polytechnique d'Abomey-Calavi (Benin) and the AIMS South Africa Master's degree in Mathematical Sciences. He is a winner of the Ibni Prize 2020, awarded every two years under the auspice of, among others, the Mathematical Society of France (SMF) and the Centre International des Mathématiques Pures et Appliquées (CIMPA). On the other hand, Dr. Dossou- Olory sometimes write guest posts about mathematics in layman terms regarding the story of his humble beginnings in Benin to pursuing a career in Mathematics together with some useful advice for the next generation of mathematicians on the shared site https://aperiodical.com/author/audacedossouolory/ andalso recently shared (https://wisaarkhu.co.za/article/what-motivated-me-to-pursue-a-career-in-mathematics/). Last but not least, Dr. Dossou-Olory is a member of both the American Mathematical Society and the South African Mathematical Society.

Dr. Audace A. V. Dossou-Olory is an Assistant Professor of Mathematics at the University of Abomey-Calavi in his home country, Benin. He conducts research in several branches of mathematics including graph theory, combinatorics and probabilistic analysis to certain extent, often motivated by applications in computer science, biology, chemistry, etc. He has been a Research Fellow at the University of Johannesburg (South Africa).

RESEARCH ACTIVITIES

- **EMA SCHOOL**

THEME: Introduction to Number Theory, Cryptography and related courses

From September 6 to 19, 2021.

There is a strong interest in Senegal to promote and develop new research areas in mathematics (in particular in Algebra, Number Theory, and Cryptography), attract new students and develop a scientific collaboration with other countries, mainly Canada, France, and USA. Holding a school in Cryptography and Number Theory in Senegal will be extremely helpful and will allow to establish scientific contacts and develop a cooperation between Senegal and France and between Senegal and USA in particular. Students attending this school will have an opportunity not only to attend mini courses that focus on some important topics of modern Cryptography and of Number Theory but also to see different applications of algebraic and arithmetic methods in cryptography. As a byproduct, we expect that the school will enhance a Western African network on Cryptography and Number Theory as well as new research collaborations in these areas, including co- sopervising of Master students. Another objective is to offer local lecturers and researchers an opportunity to give a new orientation to their teaching or research by attending the courses on Cryptography and Number Theory.

We strongly believe that a Women in Sage conference happening in AIMS Senegal and organized with the support of AWMA and the Senegalese Women in Mathematics Association (SWMA) is a great opportunity for everybody. Moreover the event will be held next a CIMPA school on number theory and cryptograhy, if the CIMPA school is approved (it is currently under evaluation by (CIMPA).

Objectives :

- to bring together African female Mathematicians to work together, motivate themselves and see different female role models.
- to start new research projects and collaborations between women mathematicians in all Africa.

- to create networks for mentoring young girls and women in Mathematical research.
- to teach African female Mathematicians new programming skills.
- last, but no least, to contribute to Sage.

SPRING SCHOOL

THEME: A mathematical modeling perspective on ecology, biodiversity & blue economy

From May 30 to June 1, 2022

Ecological resources, biodiversity, and blue economy are becoming crucial concepts for the development of sustainable ecosystems and a stable society.

Knowledge of these concepts and familiarity with the related computational methods constitute a growing demand. The Spring School will be held at the African Institute for Mathematical Sciences (AIMS) in Senegal and is targeted at enthusiastic MSc and PhD students with a keen interest in applied mathematics, ecological and socioeconomic sciences.

This Spring School will provide an opportunity for enthusiastic students to learn about these topics and the modelling techniques used to address fascinating ecological and socioeconomic problems.

The school was organized by Prof Agostino Merico (ZMT Bremen) and Prof Mouhamed Moustapha Fall (AIMS Senegal)

Participants : 52

Countries represented : l'Allemagne, Ghana, Kenya, Rwanda and Sénégal.

WORKSHOP: FISHERIES

**THEME: "Fish functional diversity and governance nexus: a new blue economy paradigm".
From 06-08 June, 2022.**

The Workshop is one of the activities undertaken within the GIZ-funded research project INDUCE- Defining socially-inclusive strategies for conserving fish functional diversity and promoting sustainable blue economy in Senegal. The aim of the workshop is to discuss how aspects of fish ecology (e.g. fish functional diversity) are reflected in the current governance policies of artisanal, small-scale fisheries and how these two dimensions (ecology and governance) can be best integrated to support the economic growth of the maritime sector in a sustainable way.

Topics covered comprise:

• Blue economy

• Small scale fisheries

• Fish functional diversity

• Fishery governance

• Habitat diversity

• Climate science

Organizers: Dr. Jailson F. de Moura (ZMT), Dr. Kwabena A. Owusu (AIMS), Prof. Moustapha Fall (AIMS), Prof. Dr. Agostino Merico (ZMT)
Participants : 24
Countries : Ghana, Senegal, Allemande

CIMPA - SCHOOL

THEME: Cryptography, Theoretical and Computational Aspects of Number Theory

From 15 to 26 August, 2022

Although cryptography has a long history, it has developed during the 20th century into a modern science with the help of computer science and mathematical objects coming from algebra, number theory, geometry, combinatorics.
The school will present modern aspects of cryptography based on number theory, algebra, algebraic geometry.

The courses will present various aspects of the subject: elementary and algebraic number theory, elliptic curves, lattices, computational aspects, and their use in cryptography. Training sessions will be devoted to PARI/GP or SageMath, two efficient computer algebra systems which are open-source and widely used by the community. The school aims at promoting and developing these new research areas for lecturers and researchers in Senegal, attracting new students and developing scientific collaborations with other countries, including co-supervising of Ph.D. students.

Researh Activities

AIMS African Institute for Mathematical Sciences SENEGAL

ARTS (African Research Training School)
AIMS-CIMPA, EMS SCHOOL AND CONFERENCE

The idea of this new project is to train Finishing-Master and PhD students from Africa during a two weeks' school session followed by a short conference from **28 August to September 17, 2022**. The instructors will not only reinforce the knowledge of the participants in some topics important for their PhD project through lectures, tutorials and working groups, but will also offer mentoring during the following years. There were two topics: Analysis of PDE and Probability and Statistics.

Each group was made of 10 students. To ensure, the event had a strong human component, through their active and stimulated participation, the students will work in groups, start their network, and have many informal scientific interactions with the professors.

Organization committee:
1. Sophie Dabo-Niang (Université de Lille)
2. Mouhamed Moustapha Fall (AIMS Senegal)
3. Christophe Ritzenthaler (Université de Rennes 1 and Université Côte d'Azur, France)
Participants: 39
Countries: Sénégal, France, Nigeria, Burina Faso, Cameroun, Cote d'Ivoire.

ACADEMIC COUNCIL

The AIMS-Senegal Academic Council is composed of renowned scientists from universities in Senegal and abroad. IT provides oversight in the development and roll-out of the curriculum. The member of the academic council are:

- Mouhamed Moustapha Fall, Centre President and Research Chair,
- Barry Green, Centre President of AIMS South-Africa,
- Mamadou Barry, UCAD, Sénégal
- Ngalla Djitte, UGB, Sénégal,
- Mouhamadou Ngom, UADB, Sénégal,
- Thierry Giordano, University of Ottawa, Canada
- Sophie Dabo Niang, University of Lille, France
- Alassane Diedhiou, University of Ziguinchor, Senegal
- Silvio Franz, University of Paris-Saclay

The academic council meeting was held online on the Zoom platform on June 03, 2022.

- Chair of the council presented the proposed 2022-2023 academic program. It will be launched with two options, the regular which focuses on research, and the Co-op option (Big data and Computer security). The main change that is made compared to the previous year is some soft skills and online teaching skills that will take place in September before the beginning of the academic year and it will be online.

The academic council made some suggestions about

- the academic calendar that should be set and ready soon so that lecturers can be
contacted in advance to avoid last-minute unavailability.
- a book of abstracts to share with lecturers in advance.
- Abdou Salam Diallo, from Aliou Diop University, to be among the lecturers of the
Differential geometry course.

Finally, the academic program was reviewed by the members of the academic council and was validated after the above observations.

Regular Students thesis defense

The regular thesis defense was held in July. The diagram below shows the different topics area.
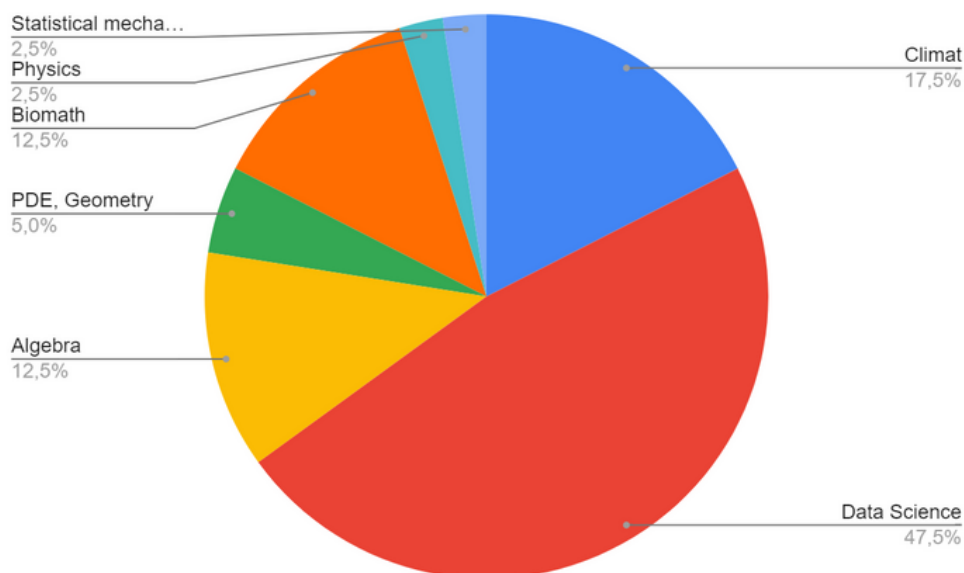
5 students from this cohort get a publication from their reseach project. We higthlight two of them

Reduction of Data Transmission in an IoT Wireless Sensor Network

Authors: Arouna Ndam Njoya, Amina Salifu, Assidé Christian Djedouboum, Allassan A. Nken Tchangmena, Ado Adamou Abba Ari, Amine Mohamed Adouane, Wahabou Abdou, Abdelhak Mourad Gueroui

Published in: Pan-African Artificial Intelligence and Smart Systems

Publisher: Springer Nature Switzerland

Quantum entanglement: an overview of the separability problem in two quantum bits,
 Authors: Honorine Gnonfin, Laure Gouba, arXiv:2208.04747 [quant-ph]

Ndam, A. N., Salifu, A., Djedouboum, A. C., Tchangmena, A. A. N., Ari, A. A. A., Adouane, A. M., Abdou, W., & Gueroui, A. M. (2023). 'Reduction of data transmission in an IoT wireless sensor network'. In: Ngatched, T.M.N., Woungang, I., Tapamo, J.R., Viriri, S. (eds) Pan-African Artificial Intelligence and Smart Systems. PAAISS 2022. Lecture Notes of the Institute for Computer Sciences, Social Informatics and Telecommunications Engineering, 459, 39-57.

Graduation

The graduation is an important step in the students career as it summarizes the academic year effort, sacrifices, engagement, commitment and achievement.

The graduation day took place on 27th July 2022. Two cohorts have graduated: 2021-2022 regular students and the 2020-2022 coop students. Three students from the 2019 academic year who haven't completed the research phase of their study at that time and have made a huge effort to achieve it in 2022 also graduated.
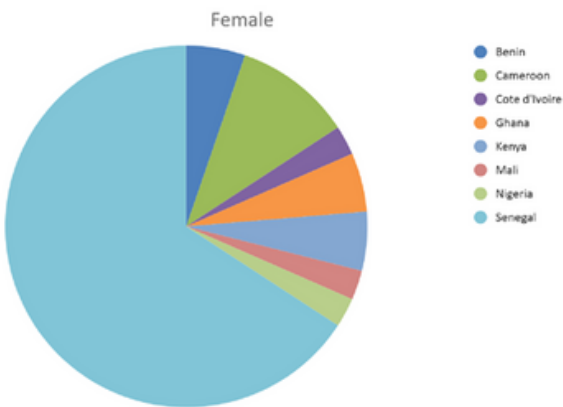
Figure 1. Number of students (Male, Female) graduated

Figure 2. Resumes the number of graduated students per cohort and gender.
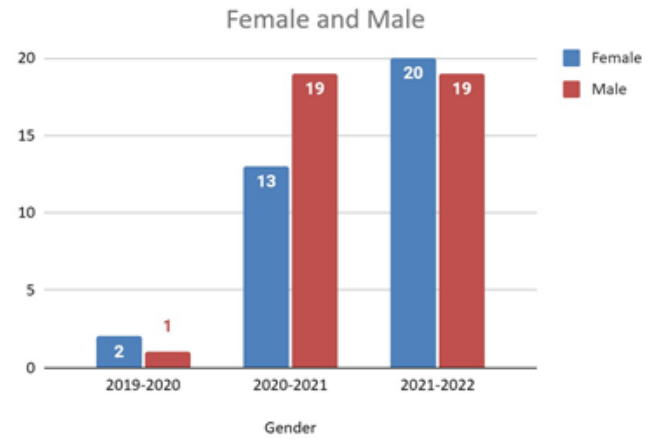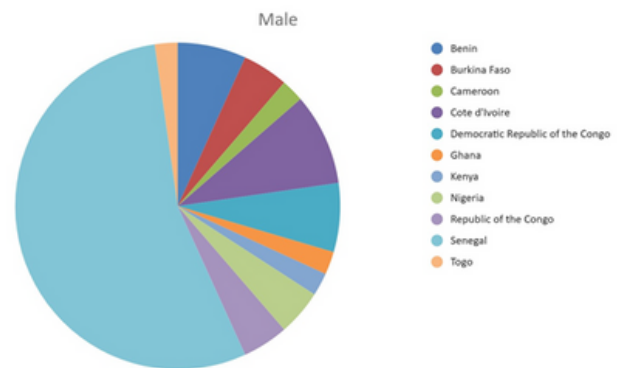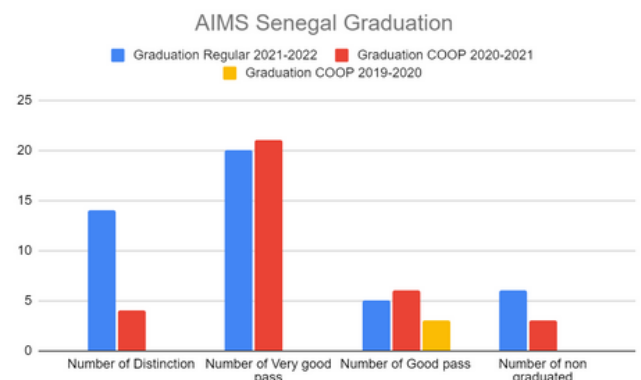

Figure 3. Resumes the number of graduated students per cohort and gender.

The scaling of the final grade at AIMS Senegal is as follow

1. **FAIL (F)**, when the grade is less than 60% of the total possible grade
2. **PASS (P)**, when the grade is between 60% and 70%
3. **GOOD PASS (P+)**, when it is between 70% and 80%
4. **VERY GOOD PASS (P++)**, when it is between 80% and 85%
5. **DISTINCTION (D)**, when it is above 85%.

The diagram below shows that 14 students out of 64 from the 2021-2022 cohort and 4 students from the 2020-2021 cohort have graduated with a DISTINCTION final grade. It also shows that 20 students out of 64 from the 2021-2022 cohort and 21 students from the 2020-2021 cohort have graduated with a VERY GOOD PASS final grade. A few number of students with the following distribution: 5 from the 2021-2022 cohort, 6 from the 2020-2021 cohort, 3 from the 2019-2020 cohort have graduated with a GOOD PASS final grade.

AIMS | African Institute for Mathematical Sciences SENEGAL

84 STUDENTS FROM 12 AFRICAN COUNTRIES.

1. Senegal
2. Benin
3. Ivory Coast
4. Cameroon
5. Nigeria
6. Kenya
7. Rwanda
8. Togo
9. RDC
10. Burkina faso
11. Niger
12. Mali

AIMS | African Institute for Mathematical Sciences SENEGAL

Celebrated

On Wednesday July 27, 2022 was held at the hotel; Palm Beach de Saly, the graduation ceremony of the 10th and 11th classes of the master's in mathematical sciences (Coop and Regular). This date, which also marks the 10th anniversary of the creation of AIMS in Senegal, was the meeting place for eminent personalities from the state, diplomats, universities and the business world.

Our supervisory ministry, the Ministry of Higher Education, Research and Innovation, headed by Dr. Cheikh Oumar ANNE, was represented by the Director General of Private Higher Education, Prof. Amadou Abdoul SOW. The Founding President, Prof. Mamadou SANGHARE and the Board President, Mr. Abdel Kader NDIAYE received diplomas of honor for their precious and unfailing services rendered to AIMS since its creation in Senegal in 2011. Prof. Saliou NDIAYE, former Rector of UCAD, Ambassador and Minister-Counsellor, representative of the Board President made a speech just after that of Pr. Moustapha FALL, President of the AIMS-Senegal Center. In these two speeches, the audience of more than 300 guests applauded the results of the graduates and the achievements of AIMS Senegal despite a difficult post-covid context.

The main speaker and sponsor Dr, Mabouba DIAGNE, mathematician, investment banker and entrepreneur took the floor following Prof. Moustapha CISSE, director of the GOOGLE-Africa research center and Founder of the AMMI program who showed his pride in the interest aroused by the AMMI program and the integration rate of the first cohort.

The sponsor commended the initiative of AIMS and urged representatives of African countries where which the students and business leaders come from to further support AIMS.

Prof **Amadou Abdoul SOW**, DG of Higher Education and representative of the Minister said he was honored and very satisfied with the results and impact of AIMS. He promised to follow the addendum file submitted to the Minister as well as all other files in order to better support AIMS. The Ambassador of Cameroon spoke on behalf of the 6 ambassadors and diplomats (Cameroon, Ghana, Nigeria, Mali, Ivory Coast and Congo) to praise the work of AIMS and express all his joy at the evolution of AIMS that he has been following for 10 years as Dean of Ambassadors.

About twenty companies have been honored for having received our students for internships over the past 5 years. In turn, they assured AIMS Senegal of their unwavering support, but also of their strategic orientations. The ceremony ended with a lunch offered to the graduates, parents and guests. Dr, Thierno GUEYE, COO of AIMS Senegal thanked the hosts on behalf of President Mouhamed Moustapha FALL and expressed his admiration for the AIMS Senegal team that he has been leading for 7 months for the work accomplished and the results obtained.

Family Photo

Awarded Partners in the graduation ceremony

Awarded Partners in the graduation ceremony

Awarded Partners in the graduation ceremony

AMMI Program Launch

Prof. Moustapha Cisse (Ph. D)

Founder & Director

Moustapha is the Head of the Google AI Center in Accra (Ghana) where he leads the research efforts in foundational machine learning and its applications to solving complex societal challenges. Moustapha is also a Professor of Machine Learning at the African Institute of Mathematical Sciences where he is the Founder and Director of the African Master's in Machine Intelligence (AMMI)

In September 2018, we launched the African Masters of Machine Intelligence (AMMI) at AIMS thanks to the sponsorship of Facebook and Google and the exceptional support of the global AI community. The goal of AMMI is to bring the best of AI education in Africa and contribute to building a healthy ecosystem of AI practitioners committed to making a positive impact on our societies.

During the past years, it has been exciting seeing them develop strong relationships and grow their technical abilities through group projects, and interactions with world-class lecturers. They now mentor students from their former institutions and are mentored by senior researchers in the field. Upon completion of the AMMI program, they will become mentors for the students of the following class.

Previously implemented at AIMS Rwanda and AIMS Ghana, AIMS Senegal is now hosting the AMMI program, with the first cohort of 39 students (33% women) since January 2021.

Nowadays, the AIMS Senegal center has welcomed more than 80 African students of 20 different nationalities, of which more than 39% are women. AMMI students follow an intense 10-month program of fundamental and master classes in mathematical sciences, the lecturers are for the most senior researchers of artificial intelligence, data sciences and work in the largest industries in the world like (Google , Facebook etc)

Figure: Percentage of number of students by country
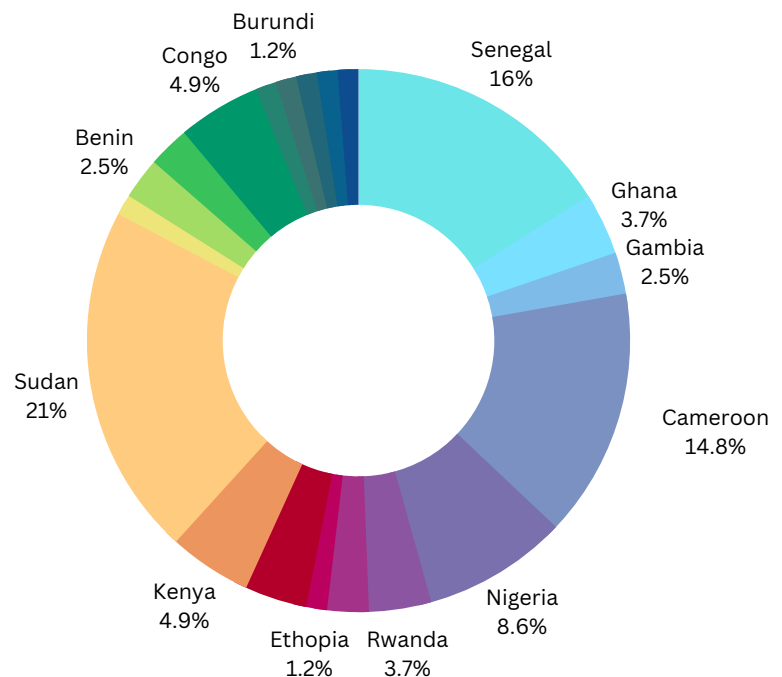
AMMI graduates will go on to create and/or join the best industrial and public R&D labs in Africa and beyond therefore strengthening the African AI community and scientific community at large, achieving crucial breakthroughs for the global good.

AIMS INDUSTRY
INITIATIVE

Started in 2013, with a vision to position AIMS as the industry's leading academic partner in Africa that achieves industry and economic advancement of the African continent.

The AIMS Industry Initiative's mission is to maximize the opportunities and potential for mathematical sciences to contribute to African economies through human capital, knowledge transfer and applied research for scientific and technological excellence.
The initiative links mathematical sciences to the needs of industry as we focus on filling the skills gap in Africa through strategic partnerships with all key relevant stakeholders.

ACTIVITIES / MILESTONES / COMPLETED DELIVERABLES

➔ **Work Integrated Learning (WIL)**
➔ Industry Linkages
➔ Partnership Development
➔ Events & Audiences

- **Work Integrated Learning (WIL)**

Through the Work Integrated Learning program, we emphasize the needs to develop a human capital and knowledge transfer through industry needs-driven capacity building programs.
We are involved in curriculum development and delivery including behavioral skills development training.
We support the implementation and pilot of Coop students Work Placement, Facilitate the Regular students interested in internships to transition to employment as Alumni listed below:


WORK INTEGRATED LEARNING (WIL)

1. Work placement of 20 coops students.
2. Facilitation of internship to regular students
3. Continuous support of transition to employment to Alumni

AIMS Industry Initiative

- **COOP Student Work Placement**

Through the Work Integrated Learning program, The Industry Initiative department pilots and facilitates the Work Placements of Coop students which is an important phase of their 10-months training.

20 Coop students were placed within our different industry partners institutions working on particular subject for a period of 6 months.

INDUSTRY PARTNERS VISITS TO THE CENTRE
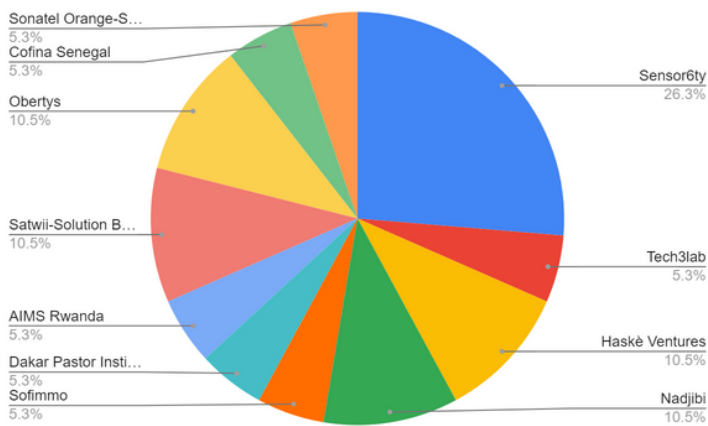
Internship Programs and Transition to Employment

Our Alumni participated in number of programs such the Mathematical Sciences for Climate Resilience (MS4CR), IVADO, and Bending Spoon. The newly graduates have been remarkably supported and recommended transiting to Employment mainly in their previous host institutions and also among other strategic partners

Photo - Bending Spoon

Photo - Ivado

• INDUSTRY LINKAGES

AIMS SENEGAL has a large number of Industry Partners among which fifty are continuously involved in our activities and programs.

Our partners operate in different sectors fintech, technologies, telecom, banking, agriculture, health, special, solar, etc…

In order to strengthen the partnership, maintain existing partners and recruit new partners, we organise inbound visits and outbound visits.

INDUSTRY PARTNERS VISITS TO THE CENTRE

Industry Partners visiting the Centre

We hosted :

❖ HASKEE VENTURES	❖ CSE
❖ NADJI BI	❖ ISESTEL
❖ ANACIM	❖ CERSGIS
❖ SONATEL	❖ AGRHYMET
❖ VOLKENO	❖ GEOMATICA
❖ ICRISAT	❖ UNIVERSITY OF FLORIDA
❖ USAID	❖ COLUMBIA UNIVERSITY
❖ NASA	

INDUSTRY PARTNERS VISITS TO THE CENTRE

The main objectives of these important visits are for partners to discover our campus, exchanging with the Centre's management on the progress of our partnership and implementation of new ideas as well as interacting with the students.

"It has been a wonderful experience knowing about AIMS and meeting the whole team at large, discovering their marvelous campus premises and mostly exchanging also networking with these young bright Africans."
Stated Dan IRWIN, NASA-SERVIR Global Director.

INDUSTRY PARTNERS VISITS TO THE CENTRE

AIMS Industry Initiative

VISITS TO INDUSTRY PARTNERS

Regarding the Outbound Industry engagement, We visited our existing and new Industry partners mainly/strategically to discuss our collaboration advancement, for the follow up of our hosted students' work placements in their institutions, receiving academic feedback for improvement/ appreciation / suggestion and elaborating on the next phases.

- **ATOS**
- **MICROSOFT**
- **OBERTYS**
- **WUTIKO**
- **DEER**
- **PARC DES TECHNOLOGIES NUMERIQUES**
- **AGENCE NATIONALE DE STATISTIQUE ET DE LA DEMOGRAPHIE**
- **HASKEE VENTURES**
- **GAINDE 2000**
- **SONATEL**
- **INTOUCH**
- **SENELEC**
- **GT TECHNOLOGIES**
- **CCDOC**
- **MANOBI**
- **EMBASSY OF NIGERIA**
- **SENSOR6TY**
- **VOLKENO**
- **AGENCE UNIVERSITAIRE DE LA FRANCOPHONIE**
- **ANACIM**
- **INSTITUT PASTEUR DE DAKAR**

Visit to our Industry Partners

AIMS Industry Initiative

PARTNERSHIP DEVELOPMENT

MoU between AIMS SENEGAL and HASKEE VENTURES

Haskè Ventures is a network of funding ventures based in Senegal; their goal is to create scalable, sustainable and profitable businesses, to fund and support entrepreneurs, bridging the gap between the idea stage and the growth stage in Francophone West Africa.

Their vision is to revolutionize the universe of start-ups in the region, by reducing the risk of failure in the early stages of the creation of start-ups.

Formalised MoU

"Collaborating with Haskè Ventures positions AIMS Senegal to broader opportunities to a large number of start-ups involving different activities and that contributes to our vision and objectives. We will work closely and progressively to make our 5-year-mutual agreement successful."

Prof Mouhamed Moustapha FALL Centre President of AIMS Senegal.
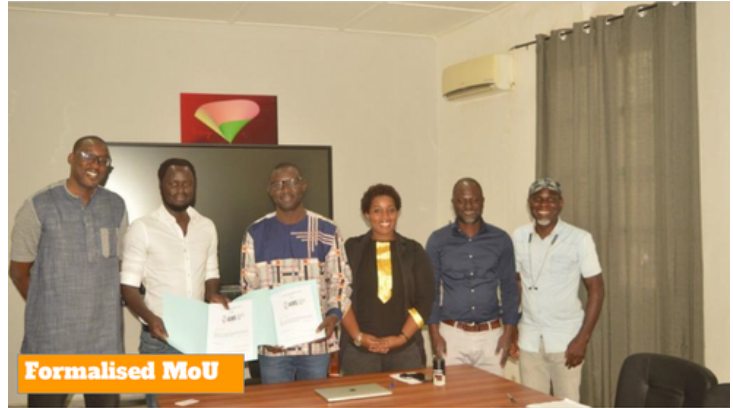
"Abdourahmane DIOP CEO of Haskè Ventures said to be delighted as AIMS Senegal is their first Academic partner institution in which they have confidence according to their particular vision mission and practices over the years. We will mutually benefit from this partnership and we are eager to the renewal after this first period."

Formalised Partnership with GEOMATICA

Formalised MoU

The geomatics field was quiet new to us but as we are open to new discoveries in alignment with the training we deliver and the aim to expose our students to the practical workforce, our collaboration with GEOMATICA proved to be satisfying and meeting our both institution's needs, With this upcoming 5 year-partnership we are confident for greater achievements.

Prof. Mouhamed Moustapha FALL/ AIMS Senegal Centre President.

"I am glad for this step of formalising our partnership with AIMS SENEGAL;
This collaboration has been existing for 4 years with fruitful and satisfying results towards the students work placements, those we maintain for employment and within our mutual organised activities."

Said Dr. Labaly Touré the CEO of GEOMATICA

GEOMATICA is specialised in the collection, organisation and processing of geospatial data through geomatics tools(GIS, remote sensing, cartography, drone, GPS,DGPS)with applications on agriculture, livestock, resources natural, health and fishing.

PARTNERSHIP DEVELOPMENT

WORKSHOP ON THE PROFESSIONAL TRAINING COMPONENT OF AIMS SENEGAL

The workshop on the professional training component of AIMS-Senegal was held on Wednesday, February 09, 2022 at the premises of AIMS in Mbour. The Minister of Employment, Vocational Training, Learning and Integration sent a strong delegation led by the Minister's Technical Advisor, Mr. **Souleye Kane**, in his capacity as the Minister's representative. Several departments were present at this meeting of exchanges that the Minister himself wished to bring, in view of the efforts that AIMS continues to deploy for capacity building and training of professionals, students, entrepreneurs and craftsmen,

Through informal exchanges, it was an opportunity for AIMS and for the participants to share ideas, good practices, to feed a common reflection on our projects, but also to find alternatives to our problems. .

Presentations and exchanges

The papers presented focused on the Presentations of AIMS Senegal and the vocational training and integration component of the latter.

Several questions were raised regarding the targets of the partnership such as: statistics on the integration rate of AIMS Senegal graduates. To this must be added the contributions of each other, in particular: the development of the partnership,

better visibility of AIMS Senegal through knowledge of the roles of the actors, the promotion of national cooperation, the establishment and functionality of consultation frameworks.

SIGNATURE AGREEMENT AIMS SENEGAL-ONFP

With more than ten years of experience in the sphere of training in the field of science, AIMS Senegal through various lines of collaboration has ratified a partnership agreement with ONFP aimed at pooling professional training offers.

Indeed, it was Thursday, March 31, 2022 at the AIMS Senegal center in Mbour that this agreement was signed, which allows AIMS Senegal to be an ONFP training operator.

Dr. **Souleymane SOUMARE** saluted the innovative approach of AIMS Senegal, the sharp nature of these specializations and the vision of its President Prof. Mouhamed M. Fall which is to open up to other skills, in particular soft skills which constitute an important link between training and professional integration.

President **Mouhamed Moustapha FALL** has in turn magnified the commitment of Dr. Souleymane SOUMARE who since his appointment as DG of the ONFP has chosen to strengthen the support of training structures for a revitalization of the sector.

EVENTS & AUDIENCES

Every year the Alumni Engagement department with the support of Industry Initiative and the Centre's, organize the Alumni Meet up in all 5 countries with AIMS Centre's. The purpose of this event is to gather all Alumni based in those countries regardless of their Centre to share their whereabouts,celebrate their successes, organize Alumni Give Back, discuss AIMS strategy, and their role into its implementation. Industry partners, governmental partners and academic partners are also invited.

❖ Support to organize the Alumni meet up
❖ Coordinating Participation in the PTN Hackathon
❖ Participation in the workshop of Master Card Foundation roadmap
❖ Coordinating the participation to the Marathon in Saint Louis
❖ Coordinating participation in the Volkeno Hackathon
❖ Coordinating participation to the Efficiency for Access Design Challenge
❖ Coordinating participation to the Hackathon RSE

EVENTS & AUDIENCES

❖ 32 Industry Partners Representatives and their teams participated in the graduation ceremony
❖ 20 Industry Partners were awarded in the graduation ceremony

Alumni Meet-up 2022

Industry partners at the Alumni Meet-up

Industry parnters at the Alumni Meet-up

AIMS Industry Initiative

AIMS Senegal participated in the Hackathon organized by Parc de Technologies Numeriques (PTN) in order to reflect on the innovative solutions of the use of the world-class infrastructure, which will make Senegal a hub attractive for investment in ICT sector.
 Our students was awarded second with a prize.

Participation in PTN Hackathon

Participation in PTN Hackathon

STUDENTS SUCCESS STORY

Khadija Ewonye

Data Scientist/Automation Engineer Sensor6ty
Khadija Ewonye got a permanent position at Sensor6ty in 2022 right after her 6 month internship.
Her job at Sensor6ty as a Data Scientist/Automation Engineer consist on Using Microsoft AI platform to automate business processes for companies. Building chat bots to automate those business process,making use of the Microsoft Power platform and Microsoft Azure.

Gods POWER Emmanuel

YAM FELLOWSIP Bonn universty
YAM enables young, talented and highly motivated African graduates of the African Institute for Mathematical Sciences (AIMS) to get to know the HCM in Bonn and immerse themselves in a field of academic and research excellence. This insight into a highly skilled international research environment is intended to have a lasting influence on their continuing personal and professional development.

STUDENTS SUCCESS STORY

Amina Salifu

My name is Amina Salifu. I have a deep passion for mathematics, data science, artificial intelligence (AI), and natural language processing (NLP). I am pursuing my PhD in Computer Engineering with a well established artificial intelligence lab (RAIL) at Kunst. I hold a BSC in mathematics and a master's degree in mathematical science from the prestigious African Institute for Mathematical Sciences (AIMS) in Senegal. Indeed, AIMS has done a lot for me during my Journey in Data Science. They have exposed me to many opportunities, Lecturers, and researchers and have shaped my life.

My primary research interest lies in natural language processing. I strive to comprehend and generate human-like text using algorithms to detect the accents and dialects in Ghanaian English. The fusion of mathematics, data science and natural language processing has the potential to revolutionize technology and automate various processes.

I am passionate about bridging the gap between mathematics, data science and NLP. I aspire to develop innovative solutions that can positively impact industries. With my recent pursuit of excellent intellectual prowess and commitment to pushing the boundaries of knowledge, I am poised to become a prominent figure in the field of data science, AI and NLP which will allow me to serve as an inspiration and motivator to others to explore the vast potential of these transformation fields and make meaningful contributions to the world.

SANDRA MARION KAM TSEMO

I am Sandra Marion Kam Tsemo, a French-speaking Cameroonian. Before joining AIMS, I obtained a Master's degree in Applied Economics and Financial Modelling from the National Advance School of Engineering. I did my undergraduate studies in mathematical sciences at the University of Yaoundé 1. In June 2021, after applying for several scholarships, I was delighted to be shortlisted for the AIMS Senegal regular option program. And I had to prepare for the interviews a few weeks later. I was very stressed, but also confident.

After my interview, I was quite reassured that my admission would not be long in coming, and a few weeks later I received the admission email that changed my life. I can't thank AIMS Senegal enough for the opportunity it gave me through this Mathematical Sciences program.

At AIMS Senegal, I was one of the few students to graduate with distinction in the 2021/22 cohort with a research thesis on "Optimal Trading Algorithms: a Machine Learning Approach" supervised by Professor Moustapha Pemy of Towson University in the United States.

GIVE BACK ACTIVITIES

AIMS Senegal regularly organizes social and academic activities during the academic year to improve the living environment in our communities, through initiatives with a positive social impact:

During the 2021 - 2022 academic year, the students and staff of AIMS Senegal, through the various collaborations already established, were able to meet young students from various colleges and high schools in the municipality of Mbour and Malicounda for a better awareness of the importance of mathematical sciences and

its applications in the real world, as well as career opportunities. for example the CEM Gouye Mouride and the College Saint Esprit.

Our students have been active every year since the establishment of the center in Mbour in 2021, for this day of visits and donations to the children of the nursery of Mbour (the orphanage), a general cleaning is organized on the premises and a donation session for orphaned children. This Give Back activity has a social impact on children and their lives.

The organization of reinforcement sessions in mathematical sciences for pupils of 3rd and final level, by solving numerous series of exercises in mathematics, physics or chemistry.

These same activaties are carried out at the center, materialized by the cleaning of a part of the beach (AIMS)

The development of the school library, involving all students in improving their study and research environment.

In the same wake of openness and sharing of scientific knowledge, we received the visit of some students from the Faculty of Science and Technology of the Gaston Berger University of Saint Louis on campus, who came to inquire about the progress of the academic program of AIMS (the environment, the classrooms and the mathematical tools used during the lessons).

TUTORAT

Tutoring is part of the AIMS model.

AIMS Senegal emphasizes the role of tutors in the academic program through their level of recruitment and their scientific profiles, to support internationally renowned or world-class professors in the point-of-career teaching delivered at AIMS Senegal.

Our tutors, for the most part, have already defended their doctoral theses in one of the fields of mathematical sciences and its applications, and others in preparation for the post-doc. They provide general assistance to the Academic Director and lecturers in the academic program, they attend classes, organize and help bright and highly motivated students from all over Africa to write computer and research projects.
Assist during and after class with problem solving by providing group and personal tutorials when necessary, contribute to the evaluation of student performance on an ongoing basis.

To facilitate student participation and follow-up, AIMS Senegal offers a tutoring fellowship that allows post-doctoral and doctoral researchers to work as dedicated teaching assistants, with the responsibility of ensuring capacity building for students. 24/7.
The unique residential nature of the institute allows optimal interaction between students and tutors, whose minimum duration of their mission extends over the academic year (Oct - July)

We have 10 tutors for this academic year 2021 - 2022, including 5 Senegalese and a Togolese, a Chadian, a Cameroonian, a Moroccan and an Ivorian
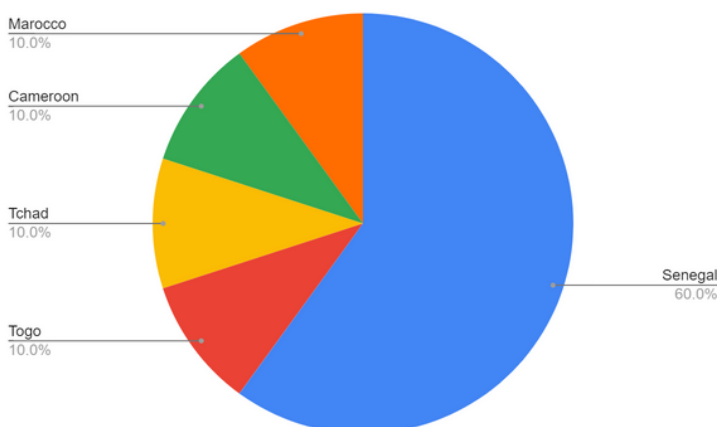
TUTORAT
We had 10 tutors with 5 from Senegal,
- *1 from Tchad,*
- *1 from Cameroon,*
- *1 from Morocco,*
- *1 from Togo*
- *1 from Ivory coast*

TUTORS PROFILS

Dr. Leila Zahhafi
Cryptography
Marocco

Papa Birane Seye
Algebra & Cryptography
Senegal

Dr. Moussa Thiaw
Algebra
Senegal

Dr. Anoumou Attiogbe
PDEs and Differential Geometry
Togo

Dr. Lema Logamou Seknewma
Statistics & Data Science
Chad

Dr. Eliane Raissa Fankem
Applied Physics, Materials and Structures
Cameroon

. Mouhammed Fall
Meteorologist - Climate & Data Scientist
Senegal

Mohamed Sylla
Ivory Coast

Testimonials from our partners

PAPA BAKAR NIANG
COFOUNDER / SENSOR6TY

Africa is a continent rich in its diversity, its cultures, its raw materials but above all its talents and gifts, still not completely put into orbit due to lack of training and quality support. Yet the continent is full of training schools, universities but paradoxically, still does not shine internationally by the voice of its African nuggets, especially in very innovative fields.

This is where our partner AIMS comes in with highly targeted training to produce the talents Africa needs to weigh in the global ecosystem and meet the challenges of today and tomorrow in key areas of sovereignty such as Cybersecurity, Data and Artificial Intelligence.

Indeed, it is no longer surprising to say that Senegal and the other countries with the presence of AIMS, benefit from international level skills, capable of competing with the best in these cutting-edge fields.

It is therefore less and less compulsory to leave Africa to have a certain level of competence once accessible only in Western countries: thanks to AIMS, which focuses on excellence, Africans can be trained in Africa, work for africa, help develop the continent and weigh on the world stage.

We Sensor6ty/ai4Sense are very proud of this strategic partner who actively contributes to the influence of Senegalese and Africa by giving us the opportunity to rely on real world-class talent. It is the beautiful meeting between actors with common ambitions of African excellence.

We wish AIMS a long life!

JOELLE SOW
EXECUTIVE SECRETARY / SENESTARUP

AIMS is a strategic partner for SENSTARTUP because we place education, science, promotion of entrepreneurship and personal development among the priorities in our advocacy.

The collaboration with AIMS brings us closer to young people and their needs.

We like AIMS for its dynamism, its substantive work with young people and the technological and scientific challenge of education. We encourage excellence and entrepreneurship among young people.
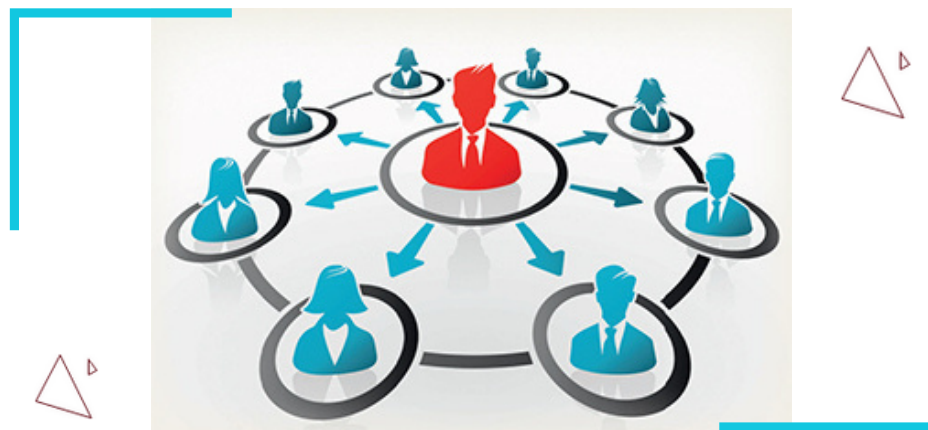
GOVERNANCE

Governance in aims Senegal is composed of two main entities which are:

The Board of Directors &
The Academic Council

The main governance body of AIMS-Senegal is the Board of Directors. It is a collegial body with eight members, including the Chairman of the Board himself. The members meet twice a year in session to conduct a assessment of management results and to provide guidance on future prospects and projects. The said sessions are held, unless major constraints, at the beginning of the year and at the beginning of the second half of the fiscal year.

The members are appointed by the ordinary general assembly. They are : the Chairman, a representative of the ministry of higher education, the highest authority (CEO) of the aims network, the President of the Academy of Sciences and Techniques, the Representative of the Mayor of Mbour, a Representative of the IRD, the President of the Centre and the COO.

The Board thus composed appointed a Chairman, Mr. Abdel Kader NDIAYE, from among its members. There are no plans for a vice-president. The Board of members has internal management power and external representation power.

Indeed, it has the power to perform all acts necessary or useful for the realization of the mission of aims-Senegal, with the exception of those that the law reserves to the academic council. However, the board does not act or deal with third parties, this role being vested upon management It also has the power to represent AIMS-Senegal vis-à-vis third parties and in court, as plaintiff or defendant.

List of the Board Directors

- **Mr Abdel Kader Ndiaye**, President of the Board - Vice-President of the Chamber of Commerce and Industry of Dakar
- **Prof. Neil Turok**, AIMS International Governing Board (IGB) Chair
- **Prof. Moussa Balde**, Minister of Higher Education Research and Innovation
- **Prof. Doudou Ba**, President, National Academy of Sciences and Techniques of Senegal (ANSTS),
- **Mrs Lydie Hakizimana**, Chief Executive Officer – AIMS NEI
- **Mrs Isabelle Henry**, Research Institute for Development (IRD), Senegal Representative
- **Mr Tidiane Mane**, Deputy Mayor of Mbour
- **Prof. Mouhamed Moustapha Fall**, Centre President & Research Chair

The Academic Council

This body is the guarantor of the content of the teachings and research undertaken within the institute. As such, it studies and validates the curricula proposed by the Academic Manager of the institute. It issues advisory opinions to the Board of Council and advises the President of the Institute.

List of the Members

- **Prof. Thierry Giordano**, University of Ottawa Canada,
- **Prof. Mama Foupouagnigni**, Chief Academic Officer - AIMS-NEI & Centre President AIMS Cameroon
- **Prof. Mouhamed Moustapha Fal**l, Centre President & Research Chair
- **Prof. Sophie Dabo Niang**, University of Lille
- **Prof. Mouhamadou Ngom,** Alioune Diop University of Bambey - Senegal
- **Prof. Ngalla Djitte,** Gaston Berger University of Saint Louis
- **Prof. Alassane Diedhiou,** University of Ziguinchor - Senegal
- **Prof. Mamadou Barry,** Cheikh Anta Diop University - Senegal
- **Prof. Barry Green,** Director AIMS South Africa (ex-offiicio)

AIMS | African Institute for Mathematical Sciences SENEGAL

STAFF 2021 - 2022

Prof. Mouhamed Moustapha Fall
Centre President

Dr. Thierno Gueye
Executive Director

Prof. Moustapha Cisse
Founder & Director African Master's
in Machine Intelligence (AMMI)

Dr. Coura Balde
Academic Manager

Diane Divine Umuhire
Industry relations Manager

Teta Bahunde
Program Manager African Master's
in Machine Intelligence (AMMI)

Ing. Mohamed Lamine Diallo
IT Manager

Ben E. Ndizera
Finance Manager

Natalie Texeira
Logistic & Facilities Manager

Jean Adoho
Students Development Manager

Modou Diakhate
Coordinator AMMI Program

Elisabeth Naty Gomis
Finance Assistante

Jeanne Madeleine Seynabou Seck
Admin & Facilities Officer

Salif Sylla
Communication Officer

Boubacar Fall
Logistic Asssitant

Serge Pacome Goudiaby
Logistic Assistant - Driver

AIMS | African Institute for Mathematical Sciences SENEGAL

Full Name	Country	Thesis
Honorine Gnonfin	BENIN	Characterizing entanglement
Lynsia Saychele Dongmo Tedo	CAMEROON	Statistial Mechanic of Machine Learning with structured data
Mame Diarra Diouf	SENEGAL	Identification of parameters for an ODE model
Bakhoum Léontine	SENEGAL	Modeling the role of viral disease in récurrent phytoplankton blooms
Kalidou Aliou Ball	SENEGAL	Ergodic theory and application to epidemic desease
Fam fall GUENE	SENEGAL	Modélisation épidémiologique sur résaux
Mamadou Waly Dia Manga	SENEGAL	Deep Q-Learning for Regime Switching Control Problems
Sandra Marion Kam Tsemo	CAMEROON	Optimal Trading Algorithms; a Machine Learning Approach
Amina Salifu	GHANA	Data transmission reduction in IoT
Kancou Dableny Fall	SENEGAL	Etudes de certaines équations diophantiennes et de la fonction d'Euler
Bahati Chadrack Kilongo	DRC	Brauer configuration algebras and its Cartan matrices
Ollé Grégoire Kam	BURKINA FASO	Hodge diamond on K3 surfaces
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Fatou Tine	SENEGAL	Maximum likelihood estimation of the drift coefficients of the cox-Ingersoll-Ross process for continuous observation
Winnie Kadzo Yaa	KENYA	Association between Phthalate Exposure and pregnancy
Malick Diaw	SENEGAL	Statistical manifolds
Amadou Aliou Ball	SENEGAL	Analytical approach to the optimality of barrier dividend strategies
Ablaye Diallo	SENEGAL	Persistent Homology and Topological Data Analysis:
Amisi Fikirini	DRC	Application to neural network model for risk prediction.
Gabriel Diouf	SENEGAL	Model spatio-temporel en machine learning
Fatou Cheikh Fall	SENEGAL	Détection de la maladie de Parkinson à l'aide de l'intelligence artificielle
Maty Sene	SENEGAL	Automatisation des evaluations dans l'enseignement superieur au Senegal
Abduljaleel Jaleel Adejumo	NIGERIA	Bayesian Kernel Machine Regression Approach to Assessing the Association between Heavy Metal Mixtures and Asthma.
Lenah Muema	KENYA	Role of Depression, Metal, Metal Mixtures and other Risk Factors on Hypertension Risk among Women.
Elie René Mulamba	DRC	Identify cancer cells based on their biophysical properties

Full Name	Country	Thesis
Khadidiatou Faye	SENEGAL	Identify cancer cells based on their biophysical properties
Waly Faye	SENEGAL	Efficient data collection with mobile sinks in IoT Networks
Issiakou Worou Wouignanso	BENIN	Efficient data collection with mobile sinks in IoT Networks
Binta Sow	SENEGAL	Breast Cancer Detection with Machine Learning
Houleymatou Diallo	SENEGAL	
Kanigui Frejus Soro	IVORY COATS	Numerical Approximations To Ruin Probabilities
Mame Diarra Diop	SENEGAL	Stress Thermique pour l'Agriculture en Afrique de Ouest
Binetou LO	SENEGAL	rainfall treshold triggering flood
Stephen Nyaranga	KENYA	Ice-Ocean interactions: Atmospheric processes affecting surface radiation budget over glaciers in the polar regions.
Aissata Diop	SENEGAL	Heat Wave Dynamics and Predictability over Senegal
Babacar Diaw	SENEGAL	Regularity techniques for local and nonlocal minimal surfaces
Verlon Roel Mbingui	CONGO	Finite element for linear Wave equation and Applications
Yacine Mame diarra Bousso Diouf	SENEGAL	Stabilité globale de modèle d'épidémie par l'approche des fonctions de Lyapunov.

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God'spower Emmanuel Okon	NIGERIA	Discrete mathematics and probability
Codou Drame	SENEGAL	Cartographie du risque de paludisme chez les enfants de moins de cinq ans au Cameroun
Ibra Cissè	SENEGAL	Local Volatility modeling and the Dupire formula
Abdoulaye Faye	SENEGAL	Modelling of the extremes of temperature in Senegal
Adiko Junior Ange Landry Ohouot	IVORY COAST	Consensus Feature Clustering for Unbiased Feature selection in Random Forests
Alassane Mbaye	SENEGAL	Suivie par imagerie satellitaire la dynamique des surfaces rizicole dans la vallée du fleuve Sénégal par le biais du Big Data
Annine Duclaire Kenne	CAMEROON	Predicting Drought over Cameroon Using Machine Learning
Awa Ndiaye	SENEGAL	What is the return period of flood events in the capital cities of Africa
Caouis Kammegne	CAMEROON	Développement d'une approche de deep learning pour la détection de sons de poissons dans une zone de mangrove: Application à une aire marine protégée du Sénégal.
Denise Victoire Mondji Sagbo	BENIN	Utilisation de l'analyse des classes latentes pour valider les mesures nutritionnelles chez les enfants de moins de cinq ans
Diouma Sira KA	SENEGAL	Consensus clustering sensitivy study

Full Name	Country	Thesis
Khadija Ewonye Yakubu	GHANA	Anomaly Detection in Network/Communication System
Fadel Kane	SENEGAL	
Fanta Soumahoro	IVORY COAST	Proposition d'algorithmes parallèles pour les approches de truth discovery standards pour le passage à l'échelle en présence de données massives
Fatou Ndiaye	SENEGAL	Technique de visualisation de données avec les coordonnées paralèles et le clustering : application à l'analyse des cours en ligne dans le supérieur lors des restrictions de la COVID-19 au Sénégal
Fatoumata Haïdara	MALI	Projected Changes in Drought Characteristics across West Africa
Gilda Rech Bansimba	CONGO	Anomaly-Based Intrusion Detection Using Autoencoders
Hassane Diakhate	SENEGAL	Implémentation d'une structure de blockchain pour sécuriser les diplomes, attestations et certificats
Ifeoma Veronica Nwabufo	NIGERIA	Combinatorial Characterisation of PAC-Learnability
Isaac Kobby Anni	GHANA	Structural approach to credit risk modeling
Khady Gaye	SENEGAL	Machine Learning pour la Classification de la vegetation

Full Name	Country	Thesis
Kouakou Innocent N'dri	IVORY COAST	Climate modeling of Senegal
Kouamé Mathurin Adou	IVORY COAST	Méthodes de machine learning pour la tarification en assurance.
Mamadou Pene	SENEGAL	Sparse Features groups Clustering
Mame Cheikh Ngom	SENEGAL	Application de l'Analyse en composantes principales (ACP) sur les modèles mathematiques de systèmes biologiques.
Mame Penda Ndao	SENEGAL	Semantic Search: Design and Implementation of a semantic Search Service for life sciences (clinical trials) documents and publications
Mazamaesso Azeyou	TOGO	Spatio-functionnal data analysis
Mbargane Aboubacry Sène	SENEGAL	Key exchange over lattices for quantum cryptography
Mouhamed El Mamoune Dieye	SENEGAL	Seasonal rainfall predictions over Senegal
Ndèye Ngoné GUEYE	SENEGAL	Improvement of the model explanation by taking into the truth-ground
Ndick Faye	SENEGAL	Sparse Consensus Clusterin
Papa Malick Gueye	SENEGAL	Les techniques ensemblistes de classification: application à la detection des cas de paludisme
Pauline Ornela Megne Choudja	CAMEROON	Exploration Des Données Climatiques et Machine Learning: Cas De La Station Nalohou Au Benin

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Soukeye Sall	SENEGAL	Investigation numerique et réponses aux incidents en environnement Microsoft Windows
Souleymane BALDE	SENEGAL	Assessement of Heatwaves Return Periods in Abidjan, Bamako, Dakar, Niamey and Ouagadougou
Yacouba Ouedraogo	BURKINA FASO	Crop yield estimation using meteorological variables in Burkina Faso

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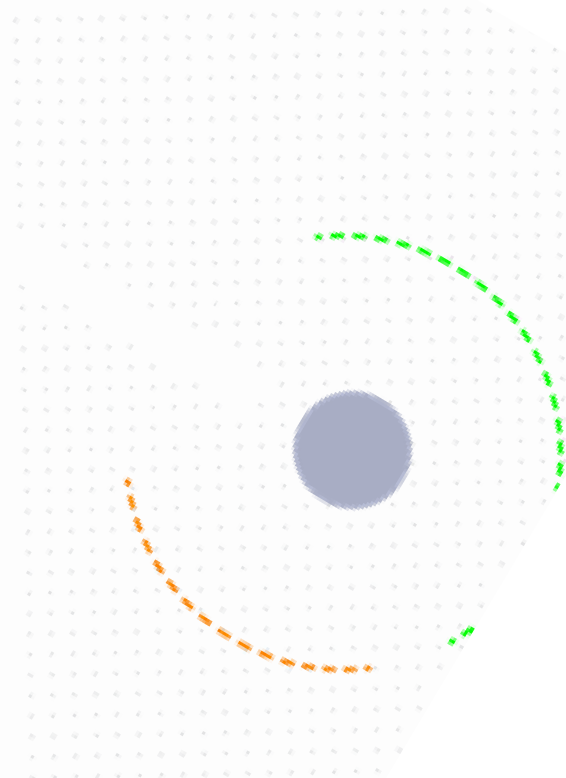
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