DECEMBER 2024

AIMS | African Institute for Mathematical Sciences CAMEROON

AIMS CAMEROON

NEWSLETTER

Strengthening Mathematics Education: AIMS TTP Empowers Cluster Leads in Bafoussam

From February 6th to 8th, 2025, 30 mathematics teachers in Bafoussam underwent an intensive three-day refresher training under the AIMS Teacher Training Program (TTP) Transition. Led by expert trainers, the sessions focused on Lesson Study, digitalization of lessons, AI integration in teaching, and the use of pedagogic videos on the MINESEC platform. This initiative aimed to reactivate cluster activities, enhance digital teaching strategies, and transform mathematics education across schools. With six digitalized lessons produced and renewed enthusiasm for innovative pedagogy, the training set the stage for a dynamic shift in classroom practices and a more engaging learning experience for students.

AIMS Cameroon Participates in Sports Activity and Health Screening in Limbe

On Saturday, December 14^{th} 2024, AIMS Cameroon staff and a few students attended a vibrant sports activity hosted by Njalla Quan Sports Academy in Limbe. The event, aimed at promoting physical fitness and community engagement, brought together participants from the city for an exciting day of sports and wellness.

In addition to the sports activities, the event also featured a free health screening session, offering participants the opportunity to check their blood pressure, blood sugar levels, and more. This initiative supported the community's well-being by providing important health services to ensure a healthier lifestyle.

Welcoming 2025 in Style! AIMS Cameroon New Year Celebration

AIMS Cameroon lecturers and staff came together for a memorable New Year celebration, marking the beginning of 2025 with joy and camaraderie. The evening was filled with laughter, great conversations, and a shared vision for the year ahead, strengthening bonds within the AIMS community. As we embark on another year of excellence in education and research, this gathering sets the tone for collaboration, innovation, and success in 2025. Cheers to a year of growth and new opportunities!

REVIEW COURSES

Supervised Learning by Dr. Olushina Olawale Awe, Global Humanistic University, Curacao, The Netherlands & Federal, University of Bahia, Brazil

This course offered a comprehensive introduction to supervised machine learning, designed for M.Sc. students with backgrounds in data science, physics, statistics, and related fields. The curriculum covered fundamental techniques such as regression, classification, and ensemble methods, blending theoretical concepts with practical applications.

Through hands-on projects and case studies, students applied machine learning techniques across various domains, preparing them for advanced research or professional roles in the rapidly evolving fields of machine learning and data science.

Introduction to Mathematical Control Theory by Dr. Patrice Ndambove, University of Buea, Cameroon

This course provided students with a solid foundation in the principles of control systems, which involve influencing a dynamical system using carefully chosen parameters (controls) to achieve a desired state or behavior.

Students examined key concepts in control theory, learning to design and analyze control systems in various applications, from industrial automation to climate regulation. By understanding these fundamental principles, they developed the ability to optimize system performance and stability in real-world engineering and scientific challenges.

Numerical Methods for Partial Differential Equations (PDEs) by Prof. Daouda Sangare[L1] , Gaston Berger University, Senegal

This course provided students with essential tools for solving complex mathematical problems using computational techniques. First, students were introduced to Scilab/MATLAB, learning basic syntax, data types, functions, and visualization techniques. Second, they explored Numerical Methods, including linear system solving, root-finding algorithms, interpolation, numerical integration, and finite difference and finite element methods for PDEs.

Through hands-on practice with FreeFem++, students developed computational skills to analyze real-world problems, preparing them for research and professional applications in mathematical modelling and scientific computing.

REVIEW COURSES

Credit risk modelling and management by Dr Viani Djeundje Biatata, Mr Paul Randallb, Mr Marc Gaudartc, respectively University of Edinburgh, previously CEO of CreditInfo, previously, Head of Analytics and Consulting at Experian

This course explored the profound transformations in lending practices driven by new data sources and advancements in mathematical methodologies (including machine learning), innovations which enabled faster and data-driven lending decisions, and improving credit risk assessment for lenders while expanding access to credit for borrowers.

Students gained a comprehensive understanding of the mathematical and business components essential for running a successful data-driven lending business.

Prof. Thomas Konrad, University of KwaZulu-Natal, South Africa: “Three theses on Quantum Information Processing and Communication”

In his talk, Professor Konrad discussed three scientific journeys in quantum physics pointing towards three theses:

1. Quantum systems can be robustly controlled by quantum systems;
2. Optical Images can be teleported;
3. Not all quantum computations can be simulated by classical optics.

Prof. Chris Cornelis, Ghent University, Belgium: “Fuzzy Rough Sets and their Application to Machine Learning”

In this talk, Chris discussed fuzzy sets and rough sets, two complementary theories from soft computing designed to model vague and inconsistent information, respectively.

Prof Cornelis then combined these approaches to address gradual inconsistencies in numerical data. Various fuzzy rough set models were explored, along with their applications in machine learning tasks such as feature selection and classification.

Romuald Ahomagnon, AIMS Cameroon student, 2024 intake: “Principal Component Analysis (PCA)”

Romuald discussed Principal Component Analysis (PCA), a statistical technique used to simplify complex datasets by transforming them into a smaller set of uncorrelated variables called principal components.

The talk emphasized how PCA preserves maximum variance, aiding in trend identification, data grouping, and noise reduction in applications like finance, healthcare, and image processing.

Weekly Seminar

Precious Awoleye, AIMS Cameroon student, 2024 intake: "Numerical Method for 1D-Heat Equation using the Finite Difference Method"

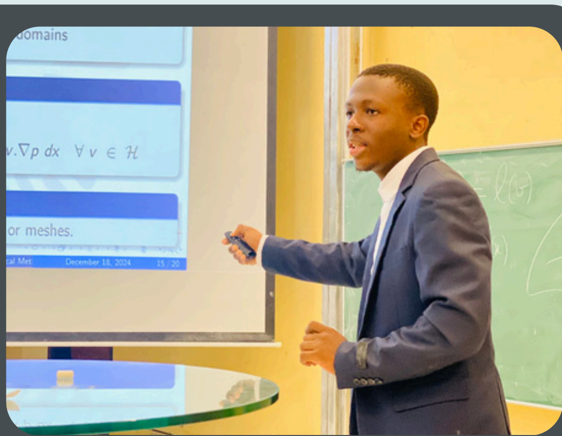
Precious derived the numerical solution of the 1D heat equation using the Finite Difference Method (FDM). The θ-scheme was employed to flexibly combine explicit and implicit approaches, with discretization applied to approximate the solution on a grid.

Stability was analyzed using the Courant-Friedrichs-Lewy (CFL) condition for the explicit scheme. Dirichlet boundary conditions and an initial condition were incorporated, and a matrix-based approach was used to solve the system of algebraic equations at each time step.

Numerical results, presented through 1D plots, illustrated the temperature evolution over time and space, demonstrating the accuracy, stability, and adaptability of the θ-scheme in solving the 1D heat equation.

Pagnol Vanité Nouga Fayo, AIMS Cameroon student, 2024 intake: "Partial Differential Equations, Numerical Methods and Overview of Stokes Equations"

In this talk, Pagnol presented partial differential equations and explored both analytical and numerical methods for solving them, with a focus on their application to the Stokes equations. He covered various numerical techniques, including the Finite Difference Method (FDM), Finite Element Method (FEM), and Finite Volume Method (FVM), highlighting their respective strengths and limitations.



Romuald Moffo Kenmo, AIMS Cameroon student, 2024 intake: "Stochastic Differential Equations and Stock Prices in the Black-Scholes Model"

In this talk, Romuald discussed the Black-Scholes model, focusing on the equation , which models stock price dynamics. By applying Itô's lemma and solving the resulting stochastic differential equation, Romuald demonstrated how the stock price follows a log-normal distribution.

This solution was highlighted as fundamental for pricing derivatives and managing risk in financial markets.