Hiruni Kamali Pallage

Contact Information

Assistant Professor of Mathematics
Olin 118
600 W Walnut St
Danville
KY, 40422

Phone: (859) 238 5403

E-mail: hiruni.pallage@centre.edu
palla1hk@cmich.edu
hkp7@pitt.edu

Education

Ph.D. in Mathematics 2024
Central Michigan University, Mount Pleasant, MI, USA

Area of Dissertation: Applied/Interdisciplinary Mathematics.

Dissertation Title: *Advancing Brain Analysis by Employing k-NN Regression in Q-Ball Imaging.*

Advisor and Dissertation Committee Chair: Dr. Yeonhyang Kim.
Dissertation Committee: Drs. Xiaoming Zheng, Leela Rakesh, and Chin-I Cheng

M.S. in Mathematics 2019
University of Pittsburgh, Pittsburgh, PA, USA

B.Sc., (Special) Degree in Mathematics 2014
University of Sri Jayewardenepura, Sri Lanka

Civil Engineering Course 2017
Institution of Engineers Sri Lanka, Sri Lanka
Part I, Part II, Part III A, and Part III B are completed.

Computer Science Diploma, Certificate Level 2010
National Institute of Business Management, Sri Lanka

Work Experience

Centre College, Danville, KY, USA Aug 2024-present
Assistant Professor, Department of Mathematics

Central Michigan University, Mt. Pleasant, MI, USA Aug 2019-Aug 2024
Graduate Assistant as an Independent Instructor (GA instructor), Dept. of Mathematics
Research Assistant, Department of Mathematics
Tutor, Mathematics Assistant Center

University of Pittsburgh, Pittsburgh, PA, USA Aug 2016-Aug 2019
Graduate Teaching Assistant (GTA), Department of Mathematics
GA instructor, Department of Mathematics
Research Fellow, Department of Mathematics
Tutor, Mathematics Assistant Center
Grader, Department of Mathematics

University of Sri Jayewardenepura, Sri Lanka Jan 2015-July 2023
Demonstrator, Department of Mathematics (Jan 2015 – July 2015)
Temporary Lecturer, Department of Mathematics (July 2015 – Feb 2016)
Probationary Lecturer, Department of Mathematics (Feb 2016 – July 2023)

University College of Construction Technology, Sri Lanka June 2015-Jul 2016
Visiting Lecturer

Teaching Experience

Department of Mathematics, Central Michigan University, USA

GA Instructor, MTH 132: Calculus I Spring 2024
Description: Limits, continuity, interpretations of the derivative, differentiation of elementary functions, applications of derivatives, antiderivatives, Riemann sums, definite integrals, fundamental theorem of calculus. Satisfies Mathematics Competency. Responsibility: drafting the syllabus, developing lessons, conducting classes, creating assessments, evaluating student performance, and mentoring (full instructor). Modality: online asynchronous.

GA Instructor, MTH 113: Mathematics: A Modeling Approach Spring 2023
Description: This course applies basic arithmetic to explore modern real-life problems, such as social choice (voting and fair division), management (traveling salesman problems), finance, and statistics. Satisfies Mathematics Competency. Responsibility: full instructor. Modality: face-to-face.

GA Instructor (Internship) MTH 223: Linear Algebra and Matrix Theory Fall 2022
Description: Systems of linear equations, matrices, determinants, vectors, vector spaces, eigenvalues, linear transformations, applications, and numerical methods. Responsibility: delivering instruction, providing mentorship, evaluating student performance through grading, and assessing their overall progress. Modality: face-to-face.

GA Instructor, MTH 107: College Algebra Fall 2021, Fall 2022
Description: Complex numbers, introduction to functions, zeros, graphing, linear functions, quadratic functions, intersections of graphs, interpreting graphs, inequalities, polynomial and rational functions, algebra of functions. Satisfies Mathematics Competency. Responsibility: full instructor. Modality: Hyflex, and online asynchronous.

GA Instructor (Internship) MTH 232: Linear Algebra & Differential Eq. Spring 2022
Description: First and second order differential equations, linear systems, matrices, vector spaces, eigenvalues and eigenvectors, systems of linear differential equations, Laplace transforms. Responsibility: full instructor. Modality: face-to-face.

GA Instructor, MTH 105: Intermediate Algebra Fall 2020, Fall 2021
Description: Rational and radical expressions and equations, integer and rational exponents, functions, graphs, systems of equations and inequalities, quadratic equations. Successful completion of this course satisfies the University Mathematics Competency requirement. Responsibility: developing lessons, conducting classes, creating some assessments, evaluating student performance, and mentoring. Modality: two online synchronous sections and one Hyflex section.

Department of Mathematics, University of Pittsburgh, USA

GTA, MATH 220 Analytical Geometry & Calculus I Fall 2017, SU 2019
Description: This is the first of a sequence of three basic calculus courses. It covers the derivative and integral of functions of one variable and their applications. Responsibility: preparing and conducting recitations, grading quizzes, helping with HW, and mentoring (full GTA). Modality: face-to-face.

GTA, MATH 230 Analytical Geometry & Calculus II Spring 2018, Fall 2018, SU 2019
Description: This is the second of a sequence of three basic calculus courses. It covers the calculus of transcendental functions, techniques of integration, series of numbers and functions, polar coordinates, and conic sections. Responsibility: full GTA. Modality: face-to-face.

Grader Fall 2016, Spring 2019
Grading Assignments in MATH 1020 - Applied Elementary Number Theory, MATH 1070 - Numerical Mathematical Analysis, and MATH 0280 - Intro to Matrices and Linear Algebra.

GA Instructor, MATH 240 Analytical Geometry & Calculus III SU 2018
Description: This is the third of a sequence of three basic calculus courses. It covers vectors and surfaces in space and the calculus of functions of several variables including partial derivatives and multiple integrals, stokes theorem, and first-order differential equations. Responsibility: full instructor. Modality: face-to-face.

GTA, MATH 240 Analytical Geometry & Calculus III SU 2017
Description: same as above. Responsibility: full GTA. Modality: face-to-face.

GTA, MATH 120 Business Calculus SU 2017
Description: This course introduces the basic concepts of limits, continuity, differentiation, integration, maximization, and minimization. Applications to the social sciences, especially business and economics, are stressed. Responsibility: full GTA. Modality: face-to-face.

Department of Mathematics, University of Sri Jayewardenepura, Sri Lanka

Probationary Lecturer, MAT 321: Abstract Algebra Feb 2016- July 2016
Description: Things Familiar and Less Familiar (A few preliminary Remarks, The Integers, Mathematical induction, Archimedean property), Group Theory, Ring Theory, Field Theory. Responsibility: full. Modality: face-to-face.

Probationary Lecturer, AMT 121: Classical Mechanics Feb 2016- July 2016
Description: delivering theoretical knowledge in classical mechanics including Constraints, Lagrange's Equation, Small Oscillations, Hamiltonian Equation, Canonical Transformations and Generating Functions, Hamilton Jacobi Equation. Responsibility: full instructor. Modality: face-to-face.

Temporary Lecturer, AMT 222: Fluid Dynamics, and Maple July 2015 – Feb 2016
Description: introducing preliminary mathematical methods used in fluid dynamics and establishing a sound theoretical knowledge on fluid flows. Responsibility: full instructor. Modality: face-to-face.

Temporary Demonstrator Jan 2015 - July 2015
Responsibility: grading assignments in Complex Analysis, Abstract Algebra and Fluid dynamics. Conducting computer lab sessions (Maple, MATLAB), and conducting tutoring sessions. Modality: face-to-face.

University College of Construction Technology, Sri Lanka

Visiting Lecturer, Mathematics June 2015 – July 2016
Description: applying basic arithmetic, algebra, trigonometry, geometry, and calculus in construction applications relevant to the supervisory level. Responsibility: full instructor. Modality: face-to-face.

Visiting Lecturer, General Economics June 2015 – July 2016
Description: using mathematics to understand microeconomics and macroeconomics topics.
Responsibility: full instructor. Modality: two face-to-face sections.

Professional Development

Project NExT cohort. 2024
The Project Next Cohort is designed to enhance faculty development by integrating innovative teaching methods, fostering collaborative research opportunities, and supporting service initiatives. Through a combination of workshops, peer mentoring, and interdisciplinary projects, participants will gain valuable skills that directly impact their teaching effectiveness, research productivity, and community engagement.

The Multi-Modal Teaching Methods Certification. Fall 2023
MTMC is a self-paced training by CIS Events and Training for Faculty, Central Michigan University that examines evidence-based strategies to translate content and expertise across multiple teaching modalities.

The Office of Curriculum and Instructional Support GTA Series Fall 2023
These face-to-face sessions are designed to enhance teaching transparency, creativity, and engagement, focusing on achieving instructional excellence through conversations about modern classroom practices under the theme "Building Excellence."

Accessibility Workshop SU 2023
This a self-paced workshop by CIS Events and Training for Faculty, Central Michigan University to introduce best practices and ensuring compliance with federal standards related to course content and digital materials for all types of learners.

Question Writing in MyOpenMath Workshop SU 2023
It was a face-to-face professional workshop for educators held at the department of Mathematics, Calvin University, MI to discuss question writing in MyOpenMath homework platform. The speaker was David Lipman who has been the driving force behind myOpenMath since its creation.

Online Teaching Experience Workshop Fall 2022
This is a self-paced workshop by CIS Events and Training for Faculty, Central Michigan University to prepare faculty to succeed as online educators and instructors.

Basic Software Literacy
MATLAB, Maple, Mathematica, Minitab, SPSS, SAS, C++, Python, Java

Research Experience

Collaborator: Image Processing of Polymer Blend Morphologies. 2024-Present
Research Project with collaborators: Drs. Li, Bingbing, Kim, Yeonhyang and Linxi, Zhang
Using MATLAB, we performed detailed image analysis on microscopic data, extracting critical quantitative features for morphology classification. Now, we focus on the combining image processing techniques with machine learning algorithms to better analyze and classify phase separation morphologies in polymer blends.

Collaborator: Recovering initial condition through dynamical sampling 2023-Present
Research Project with collaborators: Drs. Kim, Yeonhyang and Aceska, Roza
We study models for approximating time-variant systems using discrete measurements taken at later times when the initial conditions are partially unknown. The approach involves determining these unknown initial conditions of PDEs like the Laplace equation and the

variable coefficient wave equation, by measuring the system at later times from a strategically chosen location of a sensing device.

Ph.D. Student: A method that improves Q-Ball Imaging 2019-2024
Ongoing Ph.D. research at Central Michigan University, USA
This project focuses on enhancing the accuracy of orientation distribution function estimation in q-ball imaging (QBI), a high angular resolution diffusion imaging technique used in magnetic resonance imaging (MRI). The methods I use include k-NN regression, interpolation in spherical domains, regularization techniques, and the Funk Hecke Theorem. Committee: Drs. Kim, Yeonhyang (chair), Xiaoming Zheng, Leela Rakesh, and Chin-I Cheng.

Collaborator: The Mathematical Sciences in Obesity Research SU 2023
Short Course organized by Indiana University Bloomington: School of Public Health
The short course focused on applying mathematical sciences to advance obesity research, covering diverse fields like statistics, computer science, and more. It highlighted the need for complex methodologies and novel approaches beyond routine methods, aiming to bridge the gap between mathematical sciences and obesity research. As a result of this course, I am planning to join a research project in this field, leveraging the insights gained to explore the intersection between mathematical sciences and obesity in greater depth.

MS student: Optimization via Benders' Decomposition 2017-2019
Master's Thesis Project at the University of Pittsburgh, USA
This project explored Benders' Decomposition—an optimization technique simplifying complex problems by temporarily fixing variables. It delved into the classical algorithm, validated it mathematically, and examined convergence under different problem formulations. Connections to other methods, real-world applications, and broader problem extensions were covered. The study also categorized acceleration strategies and discussed limitations, trends, and future research directions. Committee: Drs. J. Wheeler, Lecturer (advisor), M. A. Trick, G. Bard Ermentrout, J. DeBlois, and M. Schneier.

Mentor: Hamiltonicity in Cayley graphs and digraphs on different groups 2018-2019
Mentored a graduate student under the guidance of Dr. GHJ Lanel
This project explored Lovász's conjecture, a question raised in 1969 about the existence of a Hamilton path in every connected, vertex-transitive graph. Despite significant efforts, the conjecture remained unresolved, with only a few exceptions found outside the realm of Cayley graphs. The study concentrated on investigating Hamiltonian cycles and paths within Cayley graphs and digraphs across various groups. Additionally, the project contemplated potential future directions for advancing our understanding of this conjecture.

B.Sc. Student: Using Audio Visual Technology in Learning A/L Mathematics in Sinhala 2014-2018
B.Sc. Final Project at University of Sri Jayewardenepura, Sri Lanka
This project tackled Sri Lankan students' heavy reliance on tuition classes and lack of self-study, especially for competitive exams like G.C.E. A/L. It emphasized the drawbacks of passive learning and memorization from tuition classes. The project's goal was to counter this with a series of engaging video lectures on Grade 12 Pure Mathematics topics. Using tools like Microsoft OneNote, PowerPoint, and Camtasia Studio, the videos aimed to encourage critical thinking and independent learning by focusing on practical applications and clarity. Supervisors: Prof. S. Weerakoon, Dr. M. Liyanage and Mr. G.J.K. Silva

B.Sc. Student and Mentor: A Strategy to Reduce the Passenger Traffic at Sri Lanka Fort Railway Station Ticketing Counters 2011-2015
Started as an Industrial Training Project at University of Sri Jayewardenepura, Sri Lanka & later mentored an undergraduate student under the guidance of Dr. GHJ Lanel

The project focused on Sri Lanka Railway Department, a major transport organization catering to 0.29 million daily passengers. Notably, the congested Coastal and Suburban area ticketing division prompted an investigation. Utilizing graph theory (rooted trees, cuts, graph coloring) for counter reorganization and queuing theory for system optimization, the project streamlined passenger flow and efficiency. Supervisor: Dr. G.H.J. Lanel

Publications

Adam J. P. Bauer, **Hiruni K. Pallage**, Yeon H. Kim, and Bingbing Li, *"Candida antarctica Lipase B-Assisted Top-down Visualization of Phase Separation Morphology of Poly(ε-caprolactone)/Poly(ethylene oxide) Blends,* in preparation.

R. Aceska, Y. Kim and **H. Pallage**, "*System approximation from later time samples on a generalized temporal grid"*, in preparation.

Pallage, H.K., and Kim, Y.H., "*Comparative Analysis of k-NN Method for Signal Estimation in Q-ball Imaging*", in preparation.

R. Aceska, Y. Kim and **H. Pallage**, "*Recovery of an initial condition from later time samples*", accepted for publication in the special volume "Women in Analysis & PDE" of the new series "Research Perspectives Ghent Analysis and PDE Center" that is part of the Springer/Birkhäuser Trends in Mathematics series.

GHJ Lanel, **HK Pallage**, JK Ratnayake, S Thevasha, BAK Welihinda, "*A survey on Hamiltonicity in Cayley graphs and digraphs on different groups"*, Discrete Mathematics, Algorithms and Applications, October 2019, https://doi.org/10.1142/S1793830919300029

Chathurika Srimali Abeykoon, **Hiruni Kamali Pallage**, Sunethra Weerakoon, Menaka Liyanage, Kapila Silva. "*Usaspela, Wasara 12 Shuddha Ganithaya* (in English: G.C.E. Advanced Level, Grade 12 Pure Mathematics)". Vidya Publishers (Pvt) Ltd, 2018 (ISBN: 978-955-7280-01-1).

Ferdinandes, M.G.R.U.K., Lanel, G.H.J., **Pallage, H.K**., and Angulgamuwa, A.N.K.. "*Enhancing the Work Performance of Coastal and Suburban Division of Sri Lanka Fort Railway Station Using Graph Coloring*" International Journal of Emerging Technology and Innovative Engineering Volume 2, Issue, 02, February 2016 (ISSN: 23946598).
Ferdinandes, M.G.R.U.K., **Pallage, H.K**., Lanel, G.H.J. and Angulgamuwa, A.N.K.. "*An improved strategy to reduce the passenger traffic at coastal and suburban area division of Sri Lanka fort railway station ticketing counters*". International Journal of Information Research and Review (IJIRR), Vol. 2, Issue, 07, pp. 909-913, July 2015. https://www.ijirr.com/improved-strategy-reduce-passenger-traffic-coastal-and-suburban-area-division-sri-lanka-fort-railway

R Ferdinandes, **H Pallage**, J Lanel, D Rodrigo and N Angulgamuwa."*A Strategy to reduce the Passenger Traffic at Sri Lanka Fort Railway Station Ticketing Counters*". International Conference on Multidisciplinary Approaches (ICMA), held at the Faculty of Graduate Studies of the USJP, paper No.: 140, 2014.

Presentations

Delivered Talks

Poster Presentation Aug 2024
PosterFest 2024: Scholarship by Early Career Mathematicians at MAA Math Fest 2024
Topic: Initial Condition Reconstruction with Dynamical Sampling

Poster Presentation April 2024
Student Creative and Research Endeavors Exhibition (SCREE) at Central Michigan Uni.
Topic: Improving Neuroimaging by Using k-NN Regression in Q-ball Imaging

Contributed Talk at 2024 Joint Mathematics Meetings (JMM 2024) Jan 2024
Moscone North/South, Moscone Center, San Francisco, CA
Topic: k-NN regression in Q-ball Imaging

Invited talk at the Kappa Mu Epsilon meeting (for Undergraduates) Nov 2023
Department of Mathematics, Central Michigan University
Topic: Exploring Brain Secrets: The power of k-NN regression in Brain Imaging

Poster Presentation Nov 2023
American Chemical Society Midland Fall Scientific Meeting
Topic: Enhancing Biochemical Insights Within the Brain via Q-ball Imaging

Contributed talk at SIAM Great Lakes 2023 meeting Oct 2023
Michigan State University, Wells Hall
Topic: Recovery of Initial Conditions from Later Time Samples

Invited talk at the Applied and Computational Mathematics Seminar Sept 2023
Department of Mathematics, Central Michigan University.
Topic: Recovery of Initial conditions through later time samples

Invited talk at the AMS Graduate Student Chapter Seminar Sept 2023
Department of Mathematics, Central Michigan University.
Topic: Graduate Student Research Spotlight

Invited talk at Ball State Fisher Center Aug 2023
Ball State University Fishers Center, IN, USA
Topic: Dynamical Sampling for Initial Condition Recovery

Invited talk at the Graduate Student Seminar Feb 2023
Department of Mathematics, Central Michigan University, USA
Topic: Q-ball Imaging

Master's thesis defense presentation Aug 2019
Department of Mathematics of University of Pittsburgh, USA
Topic: Optimization via Benders' Decomposition

Talk at International Conference on Multidisciplinary Approaches Aug 2014
Faculty of Graduate Studies of the University of Sri Jayewardenepura
Topic: A Strategy to Reduce the Passenger Traffic at Sri Lanka Fort Railway Station Ticketing Counters

Service

Central Michigan University SU 2023 – Spring 2024
College of Science and Engineering Diversity, Equity, and Inclusion Committee: *Graduate Student Representative.*

Department of Mathematics, Central Michigan University Fall 2023 – Spring 2024
American Mathematical Society Graduate Student Chapter: *Treasurer.*

Department of Mathematics, Central Michigan University Fall 2023 – Spring 2024
Open Educational Resource Committee: *Graduate Student Member.*

Department of Mathematics, Central Michigan University Fall 2023
Teaching Workshop for incoming GTAs: ***Assistant Facilitator***

Department of Mathematics, University of Sri Jayewardenepura. June 2016
I^2MC-I the first international Industrial Mathematics Conference: ***local organizing committee member*** **(https://i2mc.wordpress.com/).**

Department of Mathematics, University of Sri Jayewardenepura 2010 – July 2023
Mathematics Society: M*ember.*

Institution of Engineers Sri Lanka 2010 - Present
Student Member **(Mem. No.: S 13115)**

Awards

Student Awards -Central Michigan University, USA February 2024
Three Minute Thesis (3MT) Second Place and People's Choice Award
It is a competition where graduate students present their research in three minutes using a single PowerPoint slide, and the People's Choice Award is given to the presentation with the highest audience vote.

Student Awards -University of Sri Jayewardenepura, Sri Lanka July 2015
Dr. Sirimathi Wewala Scholarship
Awarded to the Mathematics (Special) Degree student who obtains the highest marks in the first three years of B.Sc. (Special) Degree for Mathematics
Dr. Sirimathi Wewala Gold Medal
Awarded to the student who obtains a First-Class Pass with the highest GPA at the B.Sc. (Special) Degree in Mathematics

Teaching Awards- University of Pittsburgh, USA 2018
Nominated to compete for the 2018 Elizabeth Baranger Excellence in Teaching Award for your teaching during the 2017 calendar year. This is an annual award, sponsored by the University of Pittsburgh's Arts & Sciences Graduate Student Organization, to acknowledge and promote outstanding teaching by graduate students at Pitt.

Professional Affiliations

Mathematical Association of America (MAA)
Association for Women in Mathematics (AWM)
American Mathematical Society (AMS)
Society for Industrial and Applied Mathematics (SIAM)