**Professor Patrick Azere Phiri**

**Full Professor of Applied Mathematics**

**Curriculum Vitae**

Copperbelt University

School of Mathematics and Natural Sciences

Department of Mathematics

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**Personal data:**

* Full name: Patrick Azere Phiri
* Date of birth 25 November, 1951
* Place of birth: Chipata, Zambia
* Marital status: Married with three children

**Educational Qualifications**

* Ph.D. Applied Mathematics

University of Leeds, England 1979

Title of Thesis: `*Equilibrium points and control problems in dynamic urban modelling*’

* M.Sc. Applied Mathematics

University of Zambia, 1976 (degree awarded in 1980)

Title of thesis: `*The use of statistical mechanics in urban and regional modelling*’

* B.Sc. with Merit with majors in Mathematics and Physics

University of Zambia, 1974

* Assessor Training, South Africa (2008)

**Accomplishments at Copperbelt University**

1. **Sourcing of scholarships for postgraduate students to conduct their research in Spain**
2. ERASMUS KA 107 Project: Under this project, I arrange scholarships for CBU postgraduate (Masters and Ph.D.) students to study at the University of Valladolid (UVa) in Spain. The scholarships enable them to carry out the research component of their studies at UVa. Thus the CBU students are exposed to world class facilities. The students spend five months at UVa. There are usually two batches of students that travel to Spain, one batch departs in February (returning in July) and another batch leaves in September (up to January). CBU participation in this project has been for the past seven to eight years. Furthermore, modalities are being pursued for establishing joint Master’s degree programmes for selected subjects between CBU and UVa.
3. DREAM ACP Project: Under the DREAM (Dynamising Research and Education for All through Mobility) ACP project, I organized scholarships for eleven CBU postgraduate students to spend five months each in various European universities to carry out research for their Masters degrees. This project is not on-going.
4. **Sourcing of scholarships for students from other African countries to come to CBU for their postgraduate studies**
5. AFIMEGQ Project: Through the AFIMEGQ (Africa for Innovation, Mobility, Exchange, Globalisation and Quality) project, between 2013 and 2017, I organized scholarships for seven students from various African universities came to CBU to study for their postgraduate degrees. The students came from Cameroon, Kenya, Uganda and Senegal.

**Accomplishments as SAMSA\* President**

\*SAMSA (The Southern Africa Mathematical Sciences Association) is an association of mathematicians and mathematical scientists residing in the southern African region namely, in Botswana, Lesotho, Malawi, Mozambique, South Africa, Swaziland, Tanzania, Zambia and Zimbabwe. SAMSA has done much to identify mathematicians in the region as a body with a common purpose.

* Secured funding for SAMSA for workshops and conferences from various donors as follows (1984 – 2000): International Centre for Theoretical Physics, US$80,000 (on various occasions); London Mathematical Society, £2,000; Africa Mathematical Union, US$5,000; Committee for Development and Exchange US$2,500.
* In 1996 secured funding of US$500,000 from the Norwegian Government to launch a regional Postgraduate programme. These funds were used to pool resources to make postgraduate studies accessible to many students in the southern African region (who had no access to postgraduate studies education at that time) to study for M.Sc. and Ph.D. degrees through the SAMSA initiative. The programme was initially based in Harare, then Gaborone and it is now based in Dar es Salaam. So far more than 20 PhDs and more that 100 MSc graduates have been produced by this SAMSA initiative. This SAMSA initiative is on-going.

**Summary of skills**

Administrative and leadership skills in an academic environment

* Development of an institutional plan over a fixed number of years (usually five years) in which the aims and objectives of the institution are presented in measurable terms and, periodically, the performance of the institution is gauged against those measurable terms. Measures are taken to ensure that the institution implements its aims and objectives.
* Overall administrative responsibility and resource management including equitable distribution of resources to optimize strategic and academic planning aims for the development of the institution as a professional resource centre.
* Participation in the institution’s structures of governance in an integrated approach towards the realization of the institution’s mission and objectives.
* Encouragement of the development of multi-disciplinary research programmes in close liaison with other related disciplines and rendering assistance with procurement of external funding for such programmes.
* Initiation, supervision and leading in research and promoting collaborative research locally, across institutional boundaries and internationally.
* Quality assurance: monitoring of research and teaching performance of staff.
* Preparation and justification of annual budgets, and monitoring and management of all incomes and expenditures.
* Liaison of relevant institutional structures in the recruitment of new staff and admission of new students.
* Chairing of meetings.

Skills developed as President of SAMSA

* Forging of international links to form strategic research partnerships.
* Liaison of research activities among researchers in universities and other tertiary institutions of learning.
* Forging of research partnerships in tertiary institutions of learning.
* Initiation of research projects.
* Publishing research findings in scientific journals or as Proceedings of conferences or workshops.
* Compiling of reports from representatives and the chairing of meetings.

Skills developed as Treasurer of SAMSA

* Preparing research projects and securing of funding from local and international organizations.
* Managing funds in accordance with programme budgets.
* Writing financial reports for international organisations from which funding is secured.

Skills inherent in Ph.D. training in Applied Mathematics

* The application of qualitative and quantitative methodologies to models of various phenomena and their interpretation.
* The use of software to analyse mathematical models of various phenomena and the interpretation of results.

Academic skills gained

* Publishing of research findings in journals.
* Supervision of postgraduate research students studying for Honours, Master’s and Ph.D. degrees.
* Lecturing of specific courses at both undergraduate and postgraduate level.

**Work experience**

**Copperbelt University**

School of Mathematics and Natural Sciences

Full Professor of Applied Mathematics 2011 – present

Key function: Giving undergraduate and postgraduate lectures and conducting research

Directorate for Distance Education and Open Learning

Director May 2014 – 2017

Key function: to manage all aspects of distance education and open learning at CBU

Centre for Academic Development

Director 2011 – May 2014

Key function: to provide academic support (with respect to quality assurance, standards, etc.) to all the CBU teaching Schools and the Directorates

Membership of University Committees

1. Member, Senate
2. Member, University Strategy and Risk Committee
3. Member, Standing Committee of Professors on Promotions to Professorial Ranks
4. Member, School Appointments and Planning Committee

Ph.D. Supervision

1. Gregory Lutanda Panga, `Abstract of Symplectic Yang-Mills fields’, graduated 2015.
2. Sintema Edgar John, `Concept formation in the teaching of Mathematics’. (graduated from University of Valladolid in 2020) (joint supervisor)
3. Mulenga Eddie Mumba, `Use of social media in the teaching of Mathematics’. (graduated from the University of Valladolid in 2020) (joint supervisor)
4. Justina Mulenga, `Solution of a system of nonlinear equations by Adomian decomposition method’. (expected to graduate 2023)
5. Helena Nayar, `The Differential Transform Method: a method for solving partial differential equations’. (expected to graduate 2023)

MPhil Supervision

1. Tapyuwa Nil Siasimbi, `Challenges in the learning of mathematics: a case of Kapiri Mposhi Town Schools’, graduated 2019.

MSc Supervision

1. Sakala Sakala, (graduated 2021)
2. Amos Silungwe (graduated 2022)
3. Emmanuel Simusizya (graduated 2022)

Postgraduate Teaching

1. MA 550: Advanced Calculus
2. M 511: Methods of Mathematical Physics
3. EN 611: Applied Mathematics
4. EN 612: Stochastic Processes

Undergraduate Teaching

1. M 424: Complex Analysis
2. MA 430: Complex Analysis for Education students
3. M 250: Dynamics
4. MA 210: Linear Algebra
5. MPH 310: Mathematics for Physicists III
6. MPH 410: Mathematics for Physicists IV

**University of Pretoria**

Part time Lecturer (awaiting appointment to Copperbelt University) 2009 – 2011

Undergraduate courses taught:

* Calculus, Linear Algebra, Multivariate Calculus

**North West University, Mafikeng Campus, Mathematics Department**

Associate Professor 2002 – 2009

Postgraduate student supervision

* Ph.D. Mathematics Education: Duncan Makhure, North West University, Mafikeng campus, Title of Thesis: *`Introduction to Mathematical Literacy as a Compulsory Subject Area at the Further Education and Training Phase: A Comparative Study*’ (co-supervisor), graduated 2007
* M.Sc. Applied Mathematics: Aaron Tau, North West University, Mafikeng Campus, Title of Dissertation: `*Conservation Laws in Optimal Control Theory*’ (sole supervisor), graduated 2006
* B.Sc. (Honours) Financial Mathematics: Matlhomola Jacob Xaba, North West University, Title of Project: `*The Volatility Smile and Its Implied Tree*’ (main supervisor), graduated 2006
* M.Sc. Financial Mathematics: Christelle Cronje, North West University, Potchefstroom Campus, Title of Dissertation: `*Value at Risk: The Land Bank*’ (co-supervisor), graduated 2005
* B.Sc. (Honours) Applied Mathematics: Collins Ngubane, North West University, Mafikeng Campus, completed and graduated. Title of Dissertation: `*Cell to Cell mapping for computing optimal control signals*’ (sole supervisor), graduated 2004

Postgraduate courses taught

* Optimal Control Theory, Calculus of Variations, Non-Linear Systems Theory and Global Theory and Bifurcation

Undergraduate courses taught

* Pre-Calculus I, Calculus I, Calculus II, Introduction to Mechanics, Fluid Mechanics

External Examination duties carried out

* M.Sc. Applied Mathematics, University of Limpopo, 2005
* M.Sc. Applied Mathematics, University of Limpopo, 2009
* M.Sc. Applied Mathematics, University of Fort Hare, 2009
* M.Sc. Cape Peninsula University of Technology, 2009, 2010.

**University of Swaziland (Eswatini), Mathematics Department 1982 - 2000**

Associate Professor 1994 – 2000

Senior Lecturer 1989 – 1994

Lecturer 1982 - 1989

Head of Mathematics Department 1985 – 2000

Faculty of Science Tutor 1985 – 1996

Undergraduate courses taught

Algebra, Trigonometry and Analytic Geometry, Differentiation and Integration, Multivariate Calculus, Differential Equations, Mathematics for Scientists, Quantitative Methods for Business, Dynamics I, Vector Analysis, Dynamics II, Cartesian Tensors, Special Functions, Fluid Dynamics, Logic, Set Theory, Linear Algebra, Linear Programming, Real Analysis, Group Theory, and Topology.

Undergraduate student manuals written (1993 – 1997)

* Algebra and Trigonometry for Social Scientists
* Calculus for Social Scientists
* Introduction to Differential Equations
* Elements of Complex Analysis
* Special Functions of Mathematical Physics
* Classical Mechanics
* Introduction to Fluid Mechanics
* Mathematics for Scientists
* Principles of Dynamics

External Examination duties carried out

* Ph.D. Applied Mathematics, National University of Science and Technology, Bulawayo, Zimbabwe, 2000
* M.Sc. Applied Mathematics, Makerere University, Kampala, Uganda, 1999, 2000
* B.Sc., M.Sc. Applied Mathematics, National University of Science and Technology, Bulawayo, Zimbabwe, 1998, 1999, 2000
* B.Sc. Applied Mathematics, University of Natal, Pietermaritzburg, South Africa, 1998, 1999
* B.Sc. Applied Mathematics, University of Dar es Salaam, Tanzania, 1992 – 1994, 1997 – 1999.

Membership of Committees

1. Senate
2. Admissions Committee
3. Research and Publications Committee
4. Postgraduate Studies Committee
5. Planning Committee
6. Library Committee
7. Building Committee

Editorial duties of Journals

* Editor in Chief, Southern Africa Mathematical Association (SAMSA) Journal, 2000 – 2001
* Member, Editorial Board, University of Swaziland (UNISWA) Research Journal, 1987 – 1991

**University of Zambia, Mathematics Department**

Lecturer 1979 – 1982

Postgraduate courses taught:

Control theory; Theory of differential equations; Methods of optimization

Undergraduate courses taught:

Differentiation and Integration, Analytic Geometry, Vectors, Vector Calculus, Differential Equations and Complex Analysis.

**Membership of Professional Associations**

* 2006 –present: Member, Southern African Research and Innovation Management Association (SARIMA)
* 2003 – present: Member, South African Mathematical Society (SAMS)
* 1985 –present: Member, Africa Mathematical Union (AMU) (Vice President, Southern Africa; 2000 – 2004)
* 1981 – present: Member, Southern Africa Mathematical Sciences Association (SAMSA) (President, 1991 – 2001; Treasurer, 1981 – 1991)

**Publications**

1. In refereed journals
2. Justina Mulenga and **Patrick Azere Phiri**, ``A new modified Adomian Decomposition Scheme for solving linear and non-linear boundary value problems with Neumann conditions’’, paper submitted to *Mediterranean Journal of Mathematics*, September 2022.
3. Justina Mulenga and **Patrick Azere Phiri**, ``Mathematical Modelling and Analysis of Covid-19’’, paper submitted to *Computational and Mathematical Methods in Medicine*, September, 2022.
4. Helena Nayar and **Patrick Azere Phiri**, ``The Fornberg-Whitham Equation Solved by the Diﬀerential Transform Method’’, *Journal of Advances in Mathematics and Computer Science,* 35(7), pp. 85 – 95, October 2020
5. Helena Nayar and **Patrick Azere Phiri**, ``A New Modification of the Differential Transform Method’’, *Asian Journal of Mathematics and Computer Research*, 27 (3), pp. 38 – 51, October 2020.
6. Justina Mulenga and **Patrick Azere Phiri,** ``New Modified Adomian Decomposition Method for Solving Second Order Boundary Value Problems with Newman Boundary Conditions’’, *International Journal of Science and Research*, Volume 9, Issue 9, pp. 1119 – 1123, September 2020.
7. Justina Mulenga and **Patrick Azere Phiri,** `` Solution of Two-Point Linear and Nonlinear Boundary Value Problems with Neumann Boundary Conditions Using a New Modified Adomian Decomposition Method’’, *Computers and Mathematics with Applications,* 35 (7) pp. 49 – 60, September 2020.
8. Tapyuwa Siabasonda and **Patrick Azere Phiri**, ``A comparative analysis of Zambian Primary School Pupils’ conceptual knowledge of integers and fractions’’, *Asian Journal of Current Research*, 4(1): 24 – 32, 2019.
9. Tapyuwa Siabasonda and **Patrick Azere Phiri**, ``Zambian Primary School Pupils’ knowledge of integers’’, *Journal of Basic and Applied Research International*, 25(3), 127 – 133, 2019.
10. Edgar John Sintema, **Patrick Azere Phiri** and Jose Maria Marban Prieto, ``Zambian Mathematics Pre-Service Secondary teachers’ knowledge of the function concept: theoretical framework and a literature review with implications for Zambia,’’ *Journal of Global Research in Education and Social Science*, 12 (3), pp. 133 – 147, 2018.
11. Tapyuwa Siabasonda and **Patrick Azere Phiri**, ``Identifying difficulties facing Zambian primary school pupils when learning fractions’’, *Journal of Global Research in Education and Social Science*, 12 (3), pp 121-132, 2018.
12. Helena Nayar and **Patrick Azere Phiri**, ``The solution of linearized Korteweg-de Vries equation using the differential transform method’’, *Journal of Advances in Mathematics and Computer Science* (past name *British Journal of Mathematics and Computer Science*), 29(2), pp. 1 - 10, 2018.
13. Eddie M. Mulenga and **Patrick Azere Phiri,** ``Zambian teachers’ profiles of ICT use in mathematical pedagogy’’, *Journal of Basic and Applied Research International*, 24(4), pp. 137 – 148, 2018.
14. Edgar John Sintema and **Patrick Azere Phiri**, ``An investigation of Zambian mathematics student teachers’ technological pedagogical content knowledge (TPACK)’’, *Journal of Basic and Applied Research International*, 24(2), pp. 70 – 77, June 2018.
15. Lutanda Panga G, Mateso Tailoshi B., **Patrick Azere Phiri**, Kabunda Kasakwa H, Bwalya Mulumba I., " On The Category of Symplectic Yang-Mills Fields", *International Journal of Science and Research,* Volume 7 Issue 6, pp. 1134 – 1136, June 2018.
16. G. Lutanda Panga, **P. Azere Phiri**, P. Muyumba Kabwita, ``Abstract for Symplectic Yang-Mills Fields’’, *International Journal of Innovation and Scientific Research,* Vol. 6, No. 11, pp. 1101 - 1105, November, 2017.
17. **P. A. Phiri** and O. D. Makinde, ``A computational technique for Laplace Transforms by Adomian Decomposition’’, *Asian Journal of Mathematics and Computer Research*, Vol 21, No.1, pp. 22-27, October 2017.
18. G. Lutanda Panga, **P. Azere Phiri**, P. Muyumba Kabwita, ``Yang-Mills equations for a pullback symplectic Yang-Mills field’’, *International Journal of Innovation and Scientific Research,* Vol. 6, No. 2, pp. 987 – 990, February, 2017.
19. G. Lutanda Panga, **P. Azere Phiri**, P. Muyumba Kabwita, `Kahlerian structure associated to de Sitter group’, *International Journal of Innovation and Scientific Research,* Vol. 28, No. 2, pp. 152 - 155, January, 2017.
20. **Phiri P.A.** and Makinde O.D., `Evaluating integrals of the formby Adomian decomposition’, *International Journal of Physical Sciences*, Vol. 7, Number 8, pp. 1219 – 1223, February, 2012.
21. **Phiri P.A.** and Makinde O.D., `A new derivative free method for solving nonlinear equations’, *International Journal of Physical Sciences*, Vol. 5 (7), pp. 935 – 939, July 2010.
22. Engelbrecht J, Harding A, **Phiri P.A.** `Are OBE trained learners ready for university mathematics?’ *Pythagoras*, Vol. 72, pp3 – 13, 2010.
23. Engelbrecht J, Harding A, **Phiri P.A.** `Are students who have been trained in an outcome based approach education ready for university mathematics?’ *South African Journal for Science and Technology*, Volume 28 (4), pp. 289 – 302, 2009.
24. Wafo Soh C., **Phiri, P.A.** and Pooe, C.A., Non-equivalent similarity reductions of steady 2D thermal boundary layer equations for an incompressible laminar flow over a continuous moving hot surface’, *Fluid Dynamics Research*, Vol.37, pp. 430 – 442, 2005.
25. **Phiri P.A.** and Ngomane, C., `A review of the cell mapping method’, *NWU Journal of Agriculture, Science and Technology*, Vol. 2, No. 1, pp 108 - 110, August 2004.
26. **Phiri P.A.** and Bathobame, S., `Perspectives in urban and regional modeling: equilibrium points and bifurcation’, *NWU Journal of Agriculture, Science and Technology*, Vol. 2, No. 1, pp. 99 - 101, August 2004.
27. **Phiri P.A.,** ‘Regional planning within an optimal control framework’, *International Journal of Management Systems*, Vol. 16, No. 1, pp. 71 – 82, 2000.
28. **Phiri P.A., `**A method of scaling grades’, *ABACUS, Journal of the Mathematical Association of Nigeria*, Vol. 24, No. 1, 1994.
29. Anderson, D.D., Jayaram, C. and **Phiri, P.A.,** `Baer Lattices’, *ACTA Scientiarum Mathematicarum,* Vol. 59, pp. 61 – 74, 1994.
30. **Phiri P.**A., `Rescaling marks for a purpose’, *Swaziland Institute of Education Research Bulletin*, No. 13, pp. 53 – 60, 1993.
31. **Phiri P.A**., `A comparison of assessment by closed book and open book tests’, *International Journal of Mathematics Education in Science and Technology,* Vol. 24, No. 1, pp. 23 – 26, 1993.
32. **Phiri P.A**., `The solution of optimal control problems with constraints on the state and control variables’, *Swaziland Journal of Science and Technology,* Vol. 12, pp. 55 – 66, 1991.
33. **Phiri P.A**., `Stability of shopping facility sizes’, *Swaziland Journal of Science and Technology*, Vol. 11, pp. 38 – 45, 1990.
34. **Phiri P.A., `**Application of Lera Schauder degree theory to hydrodynamic stability’, *UNISWA Research Journal*, Vol. 2, pp. 52 – 57, 1989.
35. **Phiri P.A.,** `The epsilon method for computing optimal control signals’, *Swaziland Journal of Science and Technology*, Vol. 9, No. 2, pp. 62 – 69, 1988.
36. **Phiri P.A.,** `Calculation of the equilibrium configuration of shopping facility sizes’, *Environment and Planning A*, Vol. 12, pp. 983 – 1000, 1980.
37. In conference proceedings
38. **Phiri P.A.**, `Methods of scaling marks’ paper presented at the Southern Right Delta ’09 conference, 29 Nov – 4 Dec, 2009, Gordon’s Bay, Cape Town, South Africa, 2009.
39. **Phiri P.A.** `Pooling resources for capacity building: The SAMSA experience’, paper presented at a SARIMA (Southern African Research and Innovation Management Association) conference, 10 - 12 June, 2006.
40. **Phiri P.A.,** WafoSoh C., and Pooe, C.A.,` Invariant solutions of steady 2D thermal boundary layer equations for an incompressible laminar flow over a continuous moving hot surface’, paper presented at the conference of the South Africa Mathematical Society, University of the Witwatersrand, Johannesburg, South Africa, November, 2003.
41. **Phiri P.A.**, ` An algorithm for solving systems of non-linear equations’, *Proceedings of the SAMSA Special Conference on Mathematics and Computers*, University of Zimbabwe, Harare, September, 1994.
42. **Phiri P.**A., `The robust control of non-linear equations’, *Proceedings of the SAMSA IX Symposium*, University of Botswana, Gaborone, Botswana, December 1993.
43. **Phiri P.A**., `A method of rescaling marks’, *Proceedings of the SAMSA VIII Symposium,* Maputo, Mozambique, December, 1991.
44. **Phiri P.A.**, `The use of degree theory to determine the stability of the dynamic shopping model equations’, *Proceedings of the SAMSA VIII Symposium*, Maputo, Mozambique, December, 1991.
45. **Phiri P**.**A.,** `A comparison of penalty function methods’, *Proceedings of the SAMSA VII Symposium,* Zomba, Malawi, pp. 78 – 84, 1989.
46. Books written
47. **P. A. Phiri**, D. Vuma and L. S. Luboobi, `Mathematics for Scientists and Engineers, Volume I’, UNESCO Textbook, 1997.
48. **P. A. Phiri**, V. G. Masanja, and D. Vuma, `Mathematics for Scientists and Engineers, Volume II’, UNESCO Textbook, 1998.
49. Chapters in books

1. **Phiri P.A.**, `Logic’, of the `ICTP International Village Mathematics Textbooks Project’, Chapter 14, University of Dar es Salaam, 1992.



2 October, 2022

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