

**UNIVERSITY OF NAIROBI
COLLEGE OF BIOLOGICAL & PHYSICAL SCIENCES
SCHOOL OF MATHEMATICS
ANNUAL REPORT 2010/2011**

1.0 INTRODUCTION

The School of Mathematics is one of the largest Schools in the University of Nairobi. It was established in 2005 during the restructuring from the then departments of Mathematics at CBPS and CEES. It has 44 teaching staff and 9 non-teaching staff with about 1500 students each year including more than 40 postgraduate students. Service courses students exceed 1500 in number.

The School of Mathematics offers specialized training in Pure Mathematics, Applied Mathematics, Statistics, Biometry, Actuarial Science, Modelling and Operations Research. Members of the School are actively involved in advanced and applied research of problems that arise in such diverse fields as mathematical biology, AIDS testing and control, vector control, agricultural pest control, educational and manpower planning, mathematical economics, wind energy analysis, analysis of entropy of African languages, survival analysis.

The School of Mathematics provides a lively environment for both undergraduate and postgraduate studies, and many opportunities for extra-curricular activities exist, both social and academic. The social side includes parties and various competitive events organized in collaboration with student associations.

The School invites outside speakers to present seminars to staff and students as well as arranging internal research seminars. The National Group of the International Biometric Society (IBS-Gke) has its secretariat in the school and the Group holds its monthly seminar meetings in the school. The school is also the current overall coordinating center the East African Universities Mathematics Programme (EAUMP) that aims at promoting teaching and research in Mathematics in the region in collaboration with the International Science Programme in Mathematics ISPM based in Uppsala, Sweden.

The School's organizational structure comprises of four divisions. These include the division of Pure Mathematics, Applied and Industrial Mathematics, Statistics and Operations Research and Actuarial and Financial Mathematics. These divisions are headed by a senior member of staff, in the relevant disciplines, who are charged with the key responsibility of providing subject leadership in the relevant area. Each staff member belongs to one or more of the subject areas.

In addition the School has a coordinator based at CEES who manages the teaching of mathematics for the Bachelor of Education students based in Kikuyu campus.

Graduates from the School of Mathematics find employment in many varied fields of the economy such as government departments, financial institutions, agricultural and medical research organizations, Universities, Schools and Colleges, Computing and I.T. Industry, Manufacturing Industry, Accounting and Auditing, Research and Consultancy and so on.

1.1 ACADEMIC STAFF MEMBERS AND THEIR DESIGNATIONS

DESIGNATION	2009/2010			2010/2011		
	M	F	TOTAL	M	F	TOTAL
Professors	3	0	3	3	0	3
Ass. Professors	4	0	4	6	0	6
Snr. Lecturers	9	0	9	5	0	5
Lecturers	13	2	15	20	1	15
Asst. Lecturers	1	0	1	1	0	1
Tutorial Fellow	7	2	9	12	5	9
Graduate Assistants	1	3	4	1	1	4
	TOTAL		41	TOTAL		43

2.0 STAFF APPOINTMENTS, PROMOTIONS, IN 2010/2011

2.1 NEWLY APPOINTED/RECRUITED ACADEMIC STAFF

NAME	GENDER	TITLE
Dr. Bhanderi Haresh	M	Lecturer
Mr. Jared Ongaro	M	Tutorial Fellow
Dr. Philip Ngare	M	Lecturer
Rachel Surguta	F	Graduate Assistant

2.3 Staff on Leave of Absence

NAME	GENDER	TITLE	STATUS
Prof. John W. Odhiambo	M	Professor	Leave of Absence

3.0 ACADEMIC PROGRAMMES

3.1.0 UNDERGRADUATE PROGRAMMES AND NUMBER OF STUDENTS ADMITTED IN 2011/2012 ACADEMIC YEAR

Programme: Actuarial	B.Sc.	Enrolment Figures in:						
		Module I		Module II		Sub Total		TOTAL
		M	F	M	F	M	F	
1 st Year		23	9	47	8	70	17	87
2 nd Year		21	12	48	40	69	52	121
3 rd Year		36	11	54	43	90	54	144
4 th Year		17	09	80	41	97	50	147

Programme: Mathematics	B.Sc.	Enrolment Figures in:						
		Module I		Module II		Sub Total		TOTAL
		M	F	M	F	M	F	
1 st Year		12	3	6	0	18	3	21
2 nd Year		19	6	6	2	25	8	33
3 rd Year		19	2	5	2	24	4	28
4 th Year		4	6	18	0	22	6	28

Programme: Statistics	B.Sc.	Enrolment Figures in:						
		Module I		Module II		Sub Total		TOTAL
		M	F	M	F	M	F	
1 st Year		16	3	11	6	27	9	36
2 nd Year		17	10	14	5	31	15	46
3 rd Year		13	5	14	11	27	16	43
4 th Year		10	4	6	5	16	9	25

3.1.1 POSTGRADUATE PROGRAMMES AND NUMBER OF STUDENTS ADMITTED IN 2010/2011 ACADEMIC YEAR

Programme:	Enrolment Figures in:				Sub Total		TOTAL
	Module I		Module II		M	F	
	M	F	M	F	M	F	
PGD Actuarial Science			7	0	7	0	7
M.Sc. Actuarial Science			6	0	6	0	6
M.Sc. Biometry			7	2	7	2	9
M.Sc. Social Statistics			14	4	14	4	18
M.Sc. Statistics			2	0	2	0	2
M.Sc. Applied Mathematics	3	2			3	2	5
M.Sc. Pure Mathematics	3	1			3	1	4

3.1.2 NUMBER OF STUDENTS GRADUATED PER PROGRAMME IN 2010/2011

PROGRAMME	M	F	TOTAL
Ph.D.	02	00	02
M.Sc.	22	11	33
B.Sc.	69	55	124
Postgraduate diploma	2	00	2
Diploma	1	00	1
Total			162

4.0 ONGOING RESEARCH PROJECTS

Name of Student	Title	Supervisors
Mr. Jared Ongaro	On the geometry and Topology of Moduli Spaces of representations of Surface Groups	Prof. G. P. Pokhariyal
Mr. Ndungu Reuben Muiruri	Bifurcation Analysis and Numerical Simulation of Vector – Host Malaria Models under varying Environmental Conditions.	Prof. G. P. Pokhariyal
Mr. Davis Ntwiga	Systematic Risk Model: Application to Default Rate Dynamics in a Loan Portfolio.	Prof. P.G. Weke Dr. Ivivi Mwaniki

Mr. Victor Nyaliki Mose	Modeling the Dynamics of Migrations of Large Mammals Populations in the Amboseli National Park, Kenya	Dr. Charles Nyandwi
Mr. Obudho Elias Otieno	Modelling Climate Related Index-Based Risk Transfer Products to Enhance Pastoralists' Resilience in the Drylands	Prof. P.G. Weke Dr. Thomas Achia
Ms Emma Anyika	Systematic Modeling of White Noise with Financial time Series in Decision Making	Prof. P.G. Weke
Mr. Rao Ogik Extension Loops and General Subloop Structure of	Dr. Benard Kivunge Dr. Jamen H. Were
Ms Josephine W. Kagunda	Synchronization, stability and persistence of diffusely coupled lattice oscillators with time lag	Prof. A. A. M. Wasike Prof. Wandera Ogana
Mr. George Kimanthi	Strangulation and competition in a two-species periodic chemostat	Prof. A.A.M. Wasike Prof. G. P. Pokhariyal
Ms. Carolyne Ogutu	Pricing European Risk Options Under Jump processes with Stochastic Volatility.	Prof. P.G. Weke Dr. Ivivi Mwaniki
Mrs . Ann Wangombe	Modelling of Parasite-Host Systems	J.A.M. Ottieno
Mr. Ogutu Keroboto	A review of Energy Balance Climate models with the use of a one – dimensional ,model on the vegetation change and rainfall ove Kenya In the context of Climate Change	Dr. Charles Nyandwi Prof. Moses Manene Prof. J.N. Muthama

5.0 LIST OF PUBLICATIONS IN 2010/2011

1. Ann Wangombe, (2010), A Stochastic epidemic model for tick borne diseases: Initial stages of an outbreak and endemic levels''. Accepted to be published in *Journal of Mathematical Medicine and Biology*.
2. Ann Wangombe, (2010) A stage structured stochastic epidemic model fir tick borne diseases'' Submitted to *mathematical Biosciences*.

3. Moindi, S. K. , Pokhariyal G.P. & B.M. Nzimbi (2010) Study of W_4 – Curvature Tensor on Sasakian Manifold '' KJSA / 298. Kenya National Academy of Sciences.
4. Ganesh P. Pokhariyal Effects of National Strategy Implementation on Competiveness: A case of Kenya's Trade, International Marketing and Investment Strategies. *International Journal of Business and Public Management* April 2011
5. Ganesh P. Pokhariyal & Jameela hassanali , Regression and Simulation models for Human and Babbon Brain Parameters *International journal. Morphol* ,2011
6. V.O.Omwenga, M.M. Manene and C.B. Singh Model for the Estimation of Initial Conditions in a Conflict Enviroment, *International Journal of BioChePhyiscis*, 2011
7. Okwoyo M. James, G.P. Pokhariyal Kinyanjui Mathew and Okelo Jecona.,. Stability and persistence of Sychronized Manifold of Diffusely coupled Oscillators, *Journal of far East Journal of Dynamical Systems*.2011
8. Patrick G.O. weke , Estimation of IBNR claims reserves for shortlisted insurance Contracts Using Deterministic and Stochastic Methods. *Strathmore University Mathematics Conference*, 2011
9. Patrick G.O. weke, Challenges of Educating Actuaries in Kenya 2nd African Congree of Actuaries, November 2nd – 5th ,2011.
- 10.S.K. Imagiri, J.M. Khalagai & G.P. Pokhariyal , n th – Aluthge Transform of w -Hyponormal Operators, *Far East Journal of Applied* , 2011,ICASTOR
- 11.Dr. Isaac Kipchirchir, The Versatility of the Negative Binomial Distribution in describing Dispersion, *journal of Mathematical Sciences*, 2011.
- 12.Dr. B. Mutuku, Linear Algebra II textbook, ODL materials
- 13.Ms. Josephine Kagunda , An SIS Metapopulation Modfel fro Malaria in Western Kenya with Age Structure, *second Biomathematics workshop in Narumoru*, 2011
- 14.M.kavila and J.M.Khalagai, On the Operator Equation $AB = BA$, Kenya Junior Science, 2011

6.0 WORKSHOPS/CONFERENCES ATTENDED IN 2010/2011

6.1 Conferences attended

1. 17 – 18 August, 2011, Center of Applied Research in Mathematical Sciences Strathmore University Kenya. First Strathmore Mathematics Conference: First International Conference in Mathematical Sciences. The theme of the conference was'' Strengthening Mathematics Research, Applications and Education in Africa''. This conference was attended by Dr. Damian Maingi. Prof. P.G.O Weke.
2. The, *2nd African Congress of Actuaries* held at Crown Plaza Hotel, Nairobi - Kenya, November 2nd – 5th ,2011. Participants: Dr. P.G.O. Weke, Dr. J. H. Were and Mr. I. Mwaniki, Mr. C. Achola, Dr. P. Ngare, Mr. Abednego Mureithi, Ms. Tabitha Karanja, Mr. Bitange Maina
3. Patrick G.O.Weke, *Pan African University, Addis Ababa , Ethiopia Stakeholder Curriculum Validation Meeting*, November 14th – 18th ,2011,
4. Dr. J.H. Were, Dr. Charles Nyandwi , Dr. I. Kipchirchir, Dr. Nelson Owour , Dr. T. Onyango, Ms. J. Kagunda ,Ms. Anne Wangombe Dr. J. Nkuubi, Mr. Jared Ongaro , Mr. Kipchumba, Ms. Idah Makena , Mr. John Ndiritu , Anne Mwai, Dr. I. Mwaniki, *Second Biomathematics workshop*, October 30, to November 4, 2011, Narumoru, River Lodge.
5. Prof. W. Ogana , *SAMSA 2011 Conference*, November 27,-December 3, 2011, Democratic Republic of Congo
6. Prof. Patrick Weke and Caroline Ratemo attended *29th International Congress of Actuaries ICA 2010* from 7- 12 March, 2010 Capetown, South Africa and presented a paper entitled.''*Estimating IBNR Claims Reserves for General Insurance using Archimedean Copulas.*''

7. CONSULTANCIES

- ✓ To verify internally displaced persons (IDPS) – Ministry of special Programmes
- ✓ Actuarial Valuation of the Kenya Bureau Staff Retirement benefits Scheme
- ✓ Actuarial review of the Blue Shield Medical products.
- ✓ Actuarial Study on motor Insurance industry of Kenya as Commissioned by the Association of Kenya Insurers (Report led to review of Motor insurance rates).

- ✓ Actuarial study for the design and setup of a pension scheme for Delmonte (K) Seasonal employees.
- ✓ Actuarial study for the design of a post retirement medical Scheme for University of Nairobi Lectures and Staff.

8.0 RESEARCH THESIS TITLES

1. Dr. Vincent Oteke, "Conflict Modeling And Resolution In A Dynamic State".
2. Dr. James Nkuubi , "Curvature Tensors In Sasakian,P-Sasakian,Lp-Sasakian And Einstein Sasakian Manifolds".

3. 9.0 SCHOLARSHIPS AWARD

Name of Student	Award	Amount
Mr. Bernard Kipchumba	UON	Full
Ms. Rachel Sarguta	UON	Full
Ms. Ndeda Joyce	UON	Full
Mr. Masinde Abiud Wamalwa	UON	Full
Mr. ayienda Kemunto Carolyne	UON	Full

10.0 ESTABLISHED LINKAGES

- ✓ The Eastern Africa University Mathematics Programme (EAUMP).
- ✓ Mathematical Modeling of Vector – Borne Diseases: Africa University Partnership Programme Bilateral Agreement Mathematics Programme: Joint grant under the Kenyan – South African Research.

11.0 STAFF IN SCHOOL OF MATHEMATICS

11.1 ACADEMIC STAFF

NAME	DESIGNATION	STATUS
J.W. Odhiambo	Professor	(Leave of Absence)
G.P. Pokhariyal	Professor	
B.W. Ogana	Professor	
J.A.M. Ottieno	Associate Professor	
K. Khalagai	Associate Professor	
M.M. Manene	Associate Professor	
C. Achola	Senior Lecturer	
F. Njui (Dr.)	Senior Lecturer	
C.O. Abungu(Dr.)	Senior Lecturer	
C.B. Singh	Associate Professor	
R.O. Simwa	Associate Professor	
G.O. Weke	Associate Professor	
N. Muriuki (Dr.)	Senior Lecturer	
J.H. Were (Dr.)	Senior Lecturer	
C. Nyandwi (Dr.)	Lecturer	
C.M. Ikinya	Lecturer	
A. Wachira	Lecturer	
G.M. Odwesio(Dr.)	Lecturer	
T.N. Achia (Dr.)	Lecturer	
S.W. Luketero(Dr.)	Lecturer	
J.I. Mwaniki(Dr.)	Lecturer	
J. Ndiritu	Lecturer	
J.K. Nkuubi	Lecturer	
K. Moindi(Dr.)	Lecturer	
I. Kipchirchir(Dr.)	Lecturer	
E. Muriuki	Lecturer	
Maingi D. (Dr.)	Lecturer	
A. Wafula	Assistant Lecturer	
B.M. Nzimbi(Dr.)	Lecturer	
Harish Bhanderi (Dr)	Lecturer	
Phillip Ngare	Lecturer	

NAME	DESIGNATION	STATUS
(Dr)		
I. Orowe	Tutorial Fellow	
N. Owuor	Tutorial Fellow	
W. Rao Ogik	Tutorial Fellow	
Jared Ongaro	Tutorial Fellow	
M.E. Gitau	Tutorial Fellow	
L. Agunda	Tutorial Fellow	
Okwoyo J.	Tutorial Fellow	
Imagiri K.	Tutorial Fellow	
Josephine K.	Tutorial Fellow	

11.2 NON-ACADEMIC

Grace Kiringa	Senior Admin. Asst.
Duncan Owera	Senior Technologist
Annet Mugo	Secretary
Polly Gakii.	Secretary
Jane C.	Technician
Ochieng T.	Messenger
Jane K.	Filing Clerk

12 Outreach and Extension Programmes

1. Prof. J.M Khalagai : external examiner in Kabarak University)
2. Prof. P.G.O.Weke : external Examiner in Moi University
3. Prof. M.M. Manene: external Examiner in Jomo Kenyatta University of Agriculture And Technology
4. Prof. G. P.Pokhariyal : external Examiner in Catholic University of Eastern Africa
5. Dr. F. Njui : External Examiner at African Nazarene University
6. Dr. J.H. Were: Examiner in charge of Engineering Mathematics Kenya examination Council

7. Prof. G.P. Pokhariyal, External Examiner, Makerere University, Dept. of Mathematics (Applied Mathematics)
8. Prof. P.G. O. Weke, External Examiner, Jomo Kenyatta University of Agriculture and Technology
9. Prof. P.G. O. Weke, External Examiner, Catholic University of Eastern Africa (CUEA)
10. Prof. R.O. Simwa, External Examiner, Jomo Kenyatta University of Agriculture and Technology
11. Dr. J.H. Were, External Examiner, Egerton University
12. Dr. F. Njui, Board of Governor, Ngooru Secondary School

13. Student Supervision

	Name	Project Title / Thesis	Supervision	year
1.	Kirujyibwami Celestin	On the classification of semisimple Lie algebras	Mr. Claudio Achola	2010
2.	Ileri Jane Wanja	Laplace transform solution of hydromagnetic steady flow of viscous incompressible fluid between two parallel infinite plates	Dr. C.B. Singh	2010
3.	Mutwiri Robert Mathenge	Spatial analysis and mapping of infant mortality in Kenya on the basis of demographic and health survey data	Thomas O. Achia Ann Wang'ombe	2010
4.	Ebdwube Banson Atitwa	Socio-economic determinants of low birth weight in Kenya	Mr. Elias Obudho	2010
5.	Mungai Maurice Njoroje	Modeling factors that influence place of maternal delivery	Kipchirchir I. Chumba	2010
6.	Obayo A. Eunice	Evaluation of VCT utilization by women in Kenya using the logistic regression model	Thomas O. Achia Ann	2010

			Wang'ombe	
7.	Francis Filbert	Use of generalized additive model of study the association of incidence of malaria and climate variables in epidemic prone sites in Tanzania between 1998 and 2005	Rosemary Nguti Ann Wang'ombe	2010
8.	James Kiwanuka Katende	Curvature Tensors In Sasakian, P-Sasakian, Lp-Sasakian And Einstein Sasakian Manifolds (PHD THESIS)	1.Prof. G.P Pokhariyal 2.Prof. Jairus Khalagai	2010
9.	Vincent Oteke Omwenga	Conflict Modeling And Resolution In A Dynamic State (PHD THESIS)	1.Prof.C.B Singh 2.Prof.M.M Manene	2011
10.	Kiratu Beth Nyambura	On The Spectral Properties Of 2-Isometric And Related Operators On A Hilbert Space	Dr.Bernard Nzimbi	2011
11.	Jane Gatacha	Stochastic Population Forecast For Kenya: Arima Model Approach	Ndiritu J.M	2011
12.	Omukami Howard	Multiple Regression: Bayesian Inference	Dr.F.Njui	2011
13.	Isaiah Nalinya Sitati	On Equivalence Of Some Operators In Hilbert Spaces.	Dr.Bernard Nzimbi	2011
14.	Muriithi David Kihato	On Some Properties Of Solvability Of Polynomials By Radicals	Claudio Achola	2011
15.	Chrisostim Wafula	Theoretical Risk Analysis In Insurance Using Copulas	Prof.P.G.O Weke	2011
16.	Ben Obiero	On Some Applications Of Algebra And Geometry In Coding Theory	Claudio Achola	2011
17.	Charles Kavita Makau	Construction Of A Composite Indicator On Multidimensional Poverty In Kenya Using Multiple Correspondence Analysis	Dr. Thomas Achia	2011
18.	Odhiambo Collins Ojwang	Longitudinal Analysis Of Incidence, Risk Factors And Outcomes Among Tb/Hiv	Dr. Nelson Owour	2011

		Coinfected Children		
19.	Margaret W.Mburu	Hiv And Hsv-2 Co-Infection Among Fishermen Along Lake Victoria,Kenya:An Application Of Multiple Logistic Model	1.Dr.Thomas Achia 2.Mrs.Anne Wang'ombe	2011
20.	Peris Kwamboka Momanyi	Establish A Link Between Female Genital Mutilation And Infant Mortality In Kenya	1..Dr.Thomas Achia	2011
21.	Ogutu Julie Amolo	Claim Reservatiing Using Overdispersed Poisson Model	Prof. P.G.O. Weke	2011
22.	Wamue Esther Nyatugah	Stochastic Modelling Of The Default Rates And Recovery Rates Of A Bank Loan	1.Prof. P.G.O. Weke 2.Dr.Ivivi J. Mwaniki	2011
23.	Douglas O. Barasa	Application Of Garch To Model The Kes/Us\$ Foreign Exchange Rates Returns	1.Dr.Ivivi J. Mwaniki 2.Mr.John Ndiritu	2011
24.	Gowa Peter Ochola	Modeling Of Return On Stock Price Volatility And Market Volatility.	Prof. P.G.O. Weke	2011
25.	Stanley M. Mutua	On Fredholm And Weyl Operators In Hilbert Spaces	Prof.J.M. Khalagai	2011
26.	Kibidi Solomon Amalemba	Assessing Predictors Of Child Stunting In The Slums Of Mombasa,Kenya Using Logistic Regression And Discriminant Analysis	Mr. J.N. Mwangi	2011
27.	Mbaabu Idah Makena	Using Mathematics Models To Assess The Influence Of Climate Change On Malaria Risk	Prof.Wandera Ogana	2011
28.	Linda Akoth Chaba	Modelling Of Sti Prevalence Among Hiv-Infected Adults In Hiv Care Programs In Kenya Using Logistic Regression	Dr.Nelson Owuor	2011
29.	Oweya Erick Oduor	Modelling Non-Obstetric Factors Of Cesarean Section Births	Ms.Ann Wangombe	2010
30.	Mutemi A. Mukungu	Repeated Measure Analysis On Perfomance Of Two Sets	Prof. M.M.Mane	2011

		Of Dairy Calves Fed On Maize Cowpea Gruel And Fed On Milk	ne	
31.	Ivivi Joseph Mwaniki	On Aparch Levy Filter Option Pricing Formula For Developed And Emerging Markets	1.Prof.Klimek 2.Prof.P.G.O.Weke Prof.J.Owino	2010
32.	Miriam W. Kaloko	Modeling The Prevalence Of Violence Against Women Using The Kenya Demographic Health Survey 2003	Ms.Anne Wangombe	2011
33.	Kennedy Odhiambo Omugah	Modeling The Determinants Of Fertility In Kenya Using The Kenya Demographic Health Survey	Ms.Anne Wangombe	2011
34.	Samuel K Kimote	A Comparative Analysis Of Poverty Dynamics In Relation To Household And Regional Characteristics And Farming Ststems In Kenya	Prof.M.M.M anene	2011
35.	Erick K Wamiti	Modeling Of Household Decision Making Using A Two Stage Cluster Survey Data	Prof.M.M.M anene	2011
36.	Kirichu Samuel Kiruri	Modeling Time To Sexual Debut Among Kenyan Youths:The Cox Ph Regression Model Approach	Prof.Richard Simwa	2011
37.	Samuel Kariu Kiranga	Pricing Equity-Linked Life Insurance Policies Using Stochastic Interest Rate Models	C.A.Achol a	2011
38.	Eric Mathekka Mbithi	The Impact Of Derivatives In The Nairobi Stock Exchange	C.A.Achol a	2011
39.	Happiness Babi Siagi	Application Of Eda To Trade Taxes:A Case Of Import Duty And Import Declaration Fee In Kenya	Prof.Otieno Joseph Antony Makoteku	2011
40.	John Kibet Bore	Sampling Weights Truncation In Household Sample Surveys Using Mean Square Error Procedure	Prof.Richard Simwa	2011

15. KEY EVENTS AND ACHIEVEMENT WITHIN THE SCHOOL

- ✓ Leadership Conference (30th May, 2011), organized by Nairobi University Actuarial Students Association (NASA)