THE SAMSA MASAMU PROGRAM

SAMSA

The First Masamu Advanced Study Institute and Workshops in Mathematical Sciences

December 1-14, 2011
New Fairmont Hotel
Livingstone, Zambia

THE SAMSA MASAMU PROGRAM

The primary goal of the Masamu (masamu means mathematics in Southern Africa) Program is to enhance research in mathematical sciences within Southern Africa Mathematical Sciences Association (SAMSA) institutions through promotion of international research collaboration. A key component of the Masamu Program is the Advanced Study Institute and Workshop Series in mathematical sciences that provides a platform for such collaboration. Other activities include Research Workshop, Career Development Workshop, Department Heads and Chairs and Senior Research Scientists Workshop, Colloquia and Webinar Series, and AfricaMath. The target audiences of the Advanced Study Institute are graduate students and early career faculty (rank less than associate professor) while the workshops are open to students, faculty, and other researchers in the mathematical sciences.

The US-Africa Advanced Study Institute and Workshop Series in Mathematical Sciences program is a collaborative effort between African, United Kingdom, and US mathematicians. This program has three main goals: (1) Strengthen the US and Southern African human infrastructure in mathematical sciences research; (2) Drastically increase and sustain research collaboration between UK, US and Southern African mathematicians; and (3) Improve collaboration between US and Southern African colleges and universities.

About SAMSA: The Southern Africa Mathematical Sciences Association (SAMSA) was established in 1981 to further the mathematical sciences in the Southern African region (Angola, Botswana, Lesotho, Malawi, Mozambique, Namibia, South Africa, Swaziland, Tanzania, Zambia and Zimbabwe) and beyond.

About the NSF: The National Science Foundation (NSF) is an independent US federal agency created by Congress in 1950 "to promote the progress of science; to advance the national health, prosperity, and welfare; to secure the national defense…" In many fields such as mathematics, computer science and the social sciences, NSF is the major source of federal backing for America's colleges and universities.

INSTITUTE AND WORKSHOP ORGANIZERS

Bruce Ayati (University of Iowa, USA)
Geraldo De Souza (Auburn University, USA)
Suzanne Lenhart (University of Tennessee, USA)
Edward Lungu (University of Botswana)
Anotida Madzvamuse (University of Sussex, UK)
A. J. Meir (Auburn University, USA)
Robert Smith? (University of Ottawa, Canada)
Abdul-Aziz Yakubu (Howard University, USA)

MASAMU PROGRAM STEERING COMMITTEE

Ash Abebe (Auburn University, USA)
Overtoun Jenda (Auburn University, USA)
Moatlhodi Kgosimore (Botswana College of Agriculture)
Edward Lungu (University of Botswana)
Anotida Madzvamuse (University of Sussex, UK)
Sure Mataramvura (University of Cape Town, South Africa)
Farai Nyabadza (Stellenbosch University, South Africa)
Michel Smith (Auburn University, USA)

MASAMU DEPARTMENT HEADS, CHAIRS, AND SENIOR RESEARCH SCIENTISTS WORKSHOP

Thursday, December 1, 2011

Organizers:	*Michel Smith (Auburn), Chiteng'a John Chikunji (Botswana College of Ag), Abdul-Aziz Yakubu (Howard)*
08:30 – 09:45	Current Issues in Mathematical Sciences Department
09:50 – 11:05	Developing Collaborations between Departments in the Region and Abroad
11:10 – 12:25	Joint Session: Mathematical Sciences in Careers in Government, Industry, and Academia
12:30 – 02:00	Lunch
02:10 – 05:50	Career Development Workshop Schedule (see below)
05:50 – 07:00	Break
07:00	Conference Dinner

MASAMU PROJECT CAREER DEVELOPMENT WORKSHOP

Thursday, December 1, 2011

Organizers:	*Anotida Madzvamuse (Sussex), Sure Mataramvura (Cape Town)*
11:10 – 12:25	Joint Session: Mathematical Sciences Careers in Government, Industry, and Academia
12:30 – 02:00	Lunch
02:10 – 03:25	Why PhD and How?
03:35 – 04:50	Balancing Teaching, Research, and Service
05:00 – 05:50	Importance of a Second Language in Career Development - Ismenia DeSouza
05:50 – 07:00	Break
07:00	Conference Dinner

US-AFRICA ADVANCED STUDY INSTITUTE ON ANALYSIS, DYNAMICAL SYSTEMS, AND MATHEMATICAL BIOLOGY PROGRAM

PART I: Lectures - (FRIDAY, DECEMBER 2 – TUESDAY, DECEMBER 6, 2011)

Lecturers: *A. J. Meir (Auburn, Group Leader), Geraldo De Souza (Auburn), Isaac Klapper (Montana State), Edward Lungu (Botswana), Anotida Madzvamuse (Sussex), Abdul-Aziz Yakubu (Howard)*

Day 1 (Friday, December 2)

09:00 – 09:25	Opening and Introductions – Jenda & Lungu
09:25 – 09:45	Overview of Program, Logistics, Expectations – Jenda & Meir
09:45 – 11:00	Introduction to Mathematical Biology I – Lungu
11:00 – 12:15	Mathematical Software I – Meir
12:15 – 01:30	Lunch
01:30 – 02:45	Analysis and Linear Algebra I – De Souza
02:45 – 04:00	Introduction to Mathematical Biology II – Yakubu
04:00 – 06:00	Free Time
06:00 – 07:15	Opening Day Reception
07:30 – 08:45	Problem Sessions

Day 2 (Saturday, December 3)

08:30 – 09:45	Analysis and Linear Algebra II – De Souza
09:45 – 11:00	Mathematical Software II – Madzvamuse & Meir
11:00 – 12:15	Analysis of ODEs I – Meir
12:15 – 01:30	Lunch
01:30 – 02:45	Disease Models I – Lungu
02:45 – 04:00	Numerical Approximation of Solutions of ODEs I – Madzvamuse
04:00 – 06:00	Free Time
06:00 – 07:15	Dinner
07:15 – 07:45	Recap and Overview of Day 3 – All
07:45 – 09:30	Problem Sessions

Day 3 (Sunday, December 4)

08:30 – 09:45	Analysis of ODE II – Meir
09:45 – 11:00	Disease Models II – Lungu
11:00 – 12:15	Numerical Approximation of Solutions of ODEs II – Madzvamuse
12:15 – 01:30	Lunch
01:30 – 02:45	Dynamical Systems I – Yakubu
02:45 – 04:00	Reaction Diffusion Equations I – Madzvamuse
04:00 – 06:00	Free Time
06:00 – 07:15	Dinner
07:15 – 07:45	Recap and Overview of Day 4 – All
07:45 – 09:30	Problem Sessions

Day 4 (Monday, December 5)

08:30 – 09:45	Dynamical Systems II – Yakubu
09:45 – 11:00	Reaction Diffusion Equations II – Madzvamuse
11:00 – 12:15	Numerical Analysis and Methods for PDE I – Meir
12:15 – 01:30	Lunch
01:30 – 02:45	Numerical Analysis and Methods for PDE II – Meir
02:45 – 04:00	Analysis and Linear Algebra III – De Souza
04:00 – 06:00	Free Time
06:00 – 07:15	Dinner
07:15 – 07:45	Recap and Overview of Day 5 – All
07:45 – 09:30	Problem Sessions

Day 5 (Tuesday, December 6)

08:30 – 09:45	Problem Presentations by Participants
09:45 – 11:00	How to Select and Develop Research Topics – All
11:00 – 12:15	Modeling Microbial Populations I – Klapper
12:15 – 01:30	Lunch
01:30 – 02:45	Modeling Microbial Populations II – Klapper
02:45 – 04:00	Paper Reading Assignment
04:00 – 06:00	Free Time
06:00 – 07:15	Dinner
07:15 – 07:45	Networking and Overview of Week 2
07:45 – 09:30	Problem Sessions

Wednesday, December 7

Excursion

PART II: Research - (THURSDAY, DECEMBER 8 – MONDAY, DECEMBER 12, 2011)

Research Group Leaders: *Orou Gaoue (Tennessee), Isaac Klapper (Montana State), Edward Lungu (Botswana), Anotida Madzvamuse (Sussex), A. J. Meir (Auburn), Robert Smith? (Ottawa)*

Day 6 (Thursday, December 8)

09:00 – 09:45	Recap of Week 1 and Expectations for Week 2
09:45 – 11:00	Can We Spend Our Way Out of the AIDS Epidemic? – Smith?
11:00 – 12:15	Integral projection modeling: why, how and what for? – Gaoue
12:15 – 01:30	Lunch

Day 6 (Thursday, December 8) - continued

01:30 – 02:45	The impact of media on the dynamics of human Influenza – Smith?
02:45 – 04:00	Matrix population models: deterministic and stochastic dynamics – Gaoue
04:00 – 06:00	Free Time
06:00 – 07:15	Dinner
07:15 – 09:30	Reports on Reading Assignments II

Day 7 (Friday, December 9)

08:30 – 09:45	Discussion of Group Research
09:45 – 12:15	Research Groups
12:15 – 01:30	Lunch
01:30 – 04:00	Research Groups
04:00 – 06:00	Free Time
06:00 – 07:15	Dinner
07:15 – 07:45	Recap and Overview of Day 8 – All
07:45 – 09:30	Research Groups

Day 8 (Saturday, December 10)

08:30 – 12:15	Research Groups
12:15 – 01:30	Lunch
01:30 – 04:00	Research Groups
04:00 – 06:00	Free Time
06:00 – 07:15	Dinner
07:15 – 07:45	Discussion of Future Research Collaborations
07:45 – 09:30	Research Groups

Day 9 (Sunday, December 11)

08:30 – 12:15	Research Groups
12:15 – 01:30	Lunch
01:30 – 04:00	Research Groups
04:00 – 06:00	Free Time
06:00 – 07:15	Dinner
07:15 – 07:45	Discussion of Future Research Collaborations
07:45 – 09:30	Prepare for Presentations

Day 10 (Monday, December 12)

08:30 – 11:00	Research Group Presentations
11:00 – 12:30	Working Lunch: Other Masamu Program Activities; Discussion of Future Research Collaborations; Discussion of the Upcoming Workshop; Closing Remarks

US-AFRICA RESEARCH WORKSHOP ON MATHEMATICAL MODELING OF BIOLOGICAL SYSTEMS
(MONDAY, DECEMBER 12 – WEDNESDAY, DECEMBER 14, 2011)

Day 1 (Monday, December 12)

02:00 – 03:30	Modeling the Eradication of Guinea Worm Disease - Smith?
03:30 – 05:00	Biofilm-induced Mineralization - Klapper
05:00 – 06:00	Breakout
06:30 – 07:30	Dinner and Reports from Breakouts

Day 2 (Tuesday, December 13)

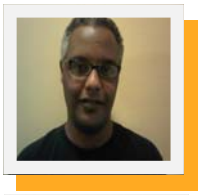
08:00 – 09:30	Saddle Point Problems, Mixed Formulations, and Applications in Fluids, Elasticity, and Poroelasticity - Meir
09:30 – 11:00	Modeling the Short and Long Term Consequence of Wild Plant Harvest by Indigenous People - Gaoue
11:00 – 12:00	Breakout
12:30 – 01:30	Lunch
02:00 – 03:30	Introduction to Stability Techniques - Lungu
03:30 – 05:00	Models for Pattern Formation During Early Growth Development: Methods, Numerics and Applications - Madzvamuse
05:00 – 06:00	Breakout
06:30 – 08:00	Dinner and Reports from Breakouts

Day 3 (Wednesday, December 14)

08:00 – 09:30	Project Outlook and Future Plans - Lungu, Jenda
09:30 – 10:00	Break
10:00 – 12:00	Regional Collaboration Plans - Lungu, Chikunji
12:30 – 01:30	Lunch
01:30	Adjournment

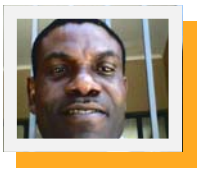
2011 Advanced Study Institute and Research Workshop Program Directory

Organizers, Lecturers, and Research Group Leaders

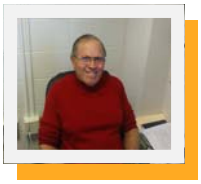


Ash Abebe - *abebeas@dms.auburn.edu*
Associate Professor of Statistics, Auburn University
Research areas include nonparametric statistics, simultaneous inference, discriminant analysis and harmonic analysis.

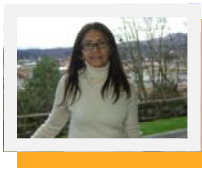
Bruce Ayati - *bruce-ayati@uiowa.edu*
Associate Professor of Mathematics, University of Iowa
Research areas include numerical mathematics applied to problems in biology, with a current emphasis on the physiologies of cancer, bone and biofilm.



Chiteng'a John Chikunji - *cjchikunji@yahoo.com*
Senior Lecturer in Mathematics and SAMSA President, Botswana College of Ag.
Research interests include classification of finite rings, unit groups and automorphism groups of finite rings, projective representations of rotation subgroups of Weyl groups and issues in mathematics education.



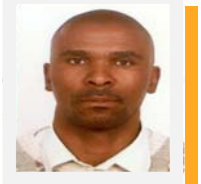
Geraldo S. DeSouza - *desougs@auburn.edu*
Professor of Mathematics, Auburn University
Research interests include classical harmonic analysis, complex analysis, functional analysis and applications.



Ismênia Sales de Souza - *Ismenia.Desouza@usafa.edu*
Associate Professor and Director of Research at the Department of Foreign Languages of US Air Force Academy and Director of the National Portuguese Exams for the American Association of Teachers of Spanish and Portuguese
Research interests: Peninsular Spanish Literature-19th Century, Brazilian Literature and Comparative Literature.

Orou Gaoue - *ogaoue@nimbios.org*
Postdoctoral Fellow, National Institute for Mathematical and Biological Synthesis (NIMBioS), University of Tennessee
Research interests include uses of field observations, experiments, mathematical and statistical models to investigate how plant-human interactions respond to environmental stochasticity.

Overtoun Jenda - *jendaov@auburn.edu*
Associate Provost for Diversity and Multicultural Affairs, Auburn University
Professor of Mathematics, Auburn University
Research areas include homological algebra, module theory, and commutative algebra.

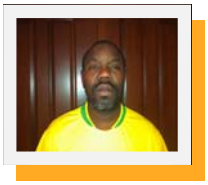


Moatlhodi Kgosimore - *mkgosi@bca.bw*
Senior Lecturer of Mathematics, Botswana College of Agriculture
Research interest include mathematical modeling of HIV and AIDS, pediatric TB; TB and HIV coinfection and Hepatitis C modeling.

Issac Klapper - *klapper@math.montana.edu*
Professor of Mathematics, Montana State University
His research interests include microbial ecology and fluid mechanics.

Suzanne Lenhart - lenhart@math.utk.edu
Professor of Mathematics and NIMBioS Associate Director for Education, Outreach, and Diversity, University of Tennessee
Research interests include partial differential equation, optimal control, population and environmental models, natural resource modeling and disease models. Dr. Lenhart is a 2011 SIAM Fellow.

Edward Lungu - lunguliz@gmail.com
Professor of Mathematics, University of Botswana, in Gabarone
Research interests include development of models in hydrology — Botswana relies on storing rainfall; ecology — domestic livestock as well as wildlife are keys to the economy; and epidemiology — to understand the progression of HIV/AIDS and how to help the victims. He is the 2011 recipient of the ICIAM Su Buchin Prize.

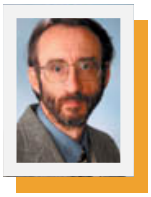


Anotida Madzvamuse - A.Madzvamuse@sussex.ac.uk
Senior Lecturer of Applied Mathematics, School of Mathematical & Physical Sciences University of Sussex
His research fields are mathematical modelling and analysis, computational biology and numerical analysis. Currently his work focuses on numerical methods for evolving surfaces.

Sure Mataramvura - Sure.Mataramvura@uct.ac.za
Senior Lecturer, Actuarial Science Department, University of Cape Town
Research interests include stochastic calculus, stochastic control, optimal stopping, financial mathematics (pricing and hedging of derivatives in complete and incomplete markets; risk measurement and management; interest rate models; insurance mathematics; actuarial

A. J. Meir - ajm@auburn.edu
Professor of Mathematics, Auburn University
His interests include numerical analysis, partial differential equations, scientific computing, applied and industrial mathematics, and interdisciplinary research.

Farai Nyabadza - nyabadzaf@sun.ac.za
Senior Lecturer of Mathematics, Stellenbosch University
His research interests include the application of mathematics to biological systems. Current focus areas are modeling waterborne infections, drug epidemics and HIV related Lymphomas. He serves as the SAMSA Secretary.



Michel Smith - smith01@auburn.edu
Professor of Mathematics and Chair, Auburn University
His research interest is topology.

Robert Smith? - rsmith43@uottawa.ca
Associate Professor of Mathematics, University of Ottawa
His research involves the application of mathematical models to study infectious diseases. He is famous for his mathematical model of zombies.

Abdul-Aziz Yakubu - ayakubu@howard.edu
Professor and Chair, Department of Mathematics, Howard University
His research investigations focus on nonlinear systems that arise in the diverse fields of ecology, epidemiology and demography.

Graduate Students and Early Career Faculty

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ACKNOWLEDGEMNTS

Thanks and appreciation to the following sponsors:

The National Science Foundation

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Billy Earle
Florence Holland
Brittany McCullough