

THE SAMSA MASAMU PROGRAM



Southern Africa Mathematical
Sciences Association



**The Fourth Annual Masamu
Advanced Study Institute (MASI) and
Workshops in Mathematical Sciences**

November 22 - November 30, 2014

**A'Zambezi River Lodge
Victoria Falls, Zimbabwe**

ACKNOWLEDGEMENTS

The Masamu program expresses our appreciation to the following sponsors:



Ambasáid na hÉireann
Embassy of Ireland
Lilongwe
Malawi



Airtel Malawi



The program wishes to extend its special thanks to the following individuals in the Auburn University Office of Diversity and Multicultural Affairs:

Sue Fuller, Executive Assistant/Business Manager
Keri Hesson, Executive Support Specialist
Brittany McCullough, Diversity Analyst, Planning & Assessment

THE SAMSA MASAMU PROGRAM

The Masamu (masamu means mathematics in Southern Africa) Program was established in 2010 with the primary goal of enhancing 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 Masamu Advanced Study Institute (MASI) and Workshop Series in mathematical sciences that provides a platform for such collaboration. Other planned 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 MASI are graduate and undergraduate 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 Masamu Advanced Study Institute (MASI) and Workshop Series in Mathematical Sciences program is a collaborative effort between African, European, 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 US, European, and Southern African mathematicians; and (3) Improve collaboration between US, European and Southern African colleges and universities.

In order to effectively use the MASI and Research Workshops, the Masamu Program has created a Collaborative Research Network consisting of 41 research faculty (16 Sub-Saharan Africa, 16 US, 2 Canada, and 7 Europe) forming 4 research teams in Pure Mathematics (Algebra and Geometry, Analysis, Topology, Coding Theory and Information Theory, and Graph Theory) and 3 research teams in Applied Mathematics (Epidemiological Modeling, Numerical Approximation of Solutions of Partial Differential Equations, and Mathematics of Finance and Statistics). Each research team has at least 4 faculty and at least 4 undergraduate and graduate students. The primary objectives of the network are to drastically increase both the quantity and quality of research publications and the number of PhD degrees especially among women and underrepresented minorities in each of the areas represented by the seven research teams in both the US and Sub-Saharan Africa, and promote research collaboration between European, Sub-Saharan Africa, and US mathematicians. Participants in this Collaborative Research Network take advantage of the annual SAMSA conferences, Masamu Institutes, and Workshops to meet face to face, work on research problems, plan research activities for the following year, and present their research findings at conferences.

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 Inquiries should be directed to:
Sub-Saharan Africa - Dr. Moatlhodi Kgosimore, mkgosi@bca.bw
United States - Dr. Ash Abebe, abebeas@auburn.edu

General Inquiries about the Masamu Program should be directed to:
Sub-Saharan Africa - Dr. Edward Lungu, lunguliz@gmail.com
United States - Dr. Overtoun Jenda, jendaov@auburn.edu







2014 ADVANCED STUDY INSTITUTE AND RESEARCH WORKSHOP PROGRAM DIRECTORY

SENIOR RESEARCH FACULTY

	Dr. Ash Abebe Associate Professor abebeas@auburn.edu	Auburn University Statistics
	Dr. Nedret Billor Professor billone@auburn.edu	Auburn University Statistics
	Dr. Busiso Chisala Associate Professor busiso.chisala@gmail.com	Mzuzu University Algebra and Geometry, Coding Theory
	Dr. Levis Eneya Senior Lecturer leneva@cc.ac.mw	University of Malawi Analysis and Optimization
	Dr. Jean-Baptiste Gatsinzi Associate Professor jgatsinzi@unam.na	University of Namibia Algebraic Topology
	Dr. Overtoun Jenda Professor and Associate Provost for Diversity & Multicultural Af- fairs jendaov@auburn.edu	Auburn University Algebra



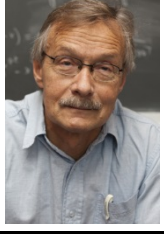



2014 ADVANCED STUDY INSTITUTE AND RESEARCH WORKSHOP PROGRAM DIRECTORY

SENIOR RESEARCH FACULTY

	Dr. Peter Johnson Professor johnspd@auburn.edu	Auburn University Discrete Mathematics: Graph Theory, Information Theory
	Dr. Moatlhodi Kgosimore Senior Lecturer kgosimor@gmail.com	Botswana College of Agriculture Mathematical Biology
	Dr. Neal Koblitz Professor koblitz@math.washington.edu	University of Washington Number Theory and Cryptography
	Dr. Suzanne Lenhart Professor lenhart@math.utk.edu	University of Tennessee Mathematical Biology
	Dr. Edward Lungu Professor lunguliz@gmail.com	University of Botswana Mathematical Biology, Stochastic Analysis
	Dr. Fortuné Massamba Associate Professor massamba@ukzn.ac.za	University of Kwazulu-Natal Algebra and Geometry

2014 ADVANCED STUDY INSTITUTE AND RESEARCH WORKSHOP PROGRAM DIRECTORY

SENIOR RESEARCH FACULTY

	<p>Dr. Sure Mataramvura</p> <p>Senior Lecturer</p> <p>sure.mataramvura@uct.ac.za</p>	<p>University of Cape Town</p> <p>Financial Mathematics, Stochastic Processes</p>
	<p>Dr. Erkan Nane</p> <p>Associate Professor</p> <p>ezn0001@auburn.edu</p>	<p>Auburn University</p> <p>Probability</p>
	<p>Dr. Bernt Øksendal</p> <p>Professor</p> <p>oksendal@math.uio.no</p>	<p>University of Oslo</p> <p>Financial Mathematics, Stochastic Processes</p>
	<p>Dr. Kevin Phelps</p> <p>Professor</p> <p>phelpkt@auburn.edu</p>	<p>Auburn University</p> <p>Discrete Mathematics: Combinatorics; Coding Theory; Design Theory</p>
	<p>Dr. John Ryan</p> <p>Professor</p> <p>jar@mzuzu.org</p>	<p>Mzuzu University</p> <p>Discrete Mathematics: Coding Theory and Information Theory</p>
	<p>Dr. Habtu Zegeye</p> <p>Professor</p> <p>habtuzh@yahoo.com</p>	<p>University of Botswana</p> <p>Analysis</p>

2014 ADVANCED STUDY INSTITUTE AND RESEARCH WORKSHOP PROGRAM DIRECTORY

PARTICIPANTS

Name	Institution	Classification	Research Area
Harrison Banda	Mzuzu University	Undergraduate Student	Coding Theory
Michael Amos Banda	Mzuzu University	Undergraduate Student	Coding Theory
Alick Boxen	Mzuzu University	Undergraduate Student	Coding Theory
Hannah Correia	Auburn University	Graduate Student	Statistics
Obonye Doctor	University of Botswana	Graduate Student	Stochastic Analysis
Christina Edholm	University of Nebraska	Graduate Student	Mathematical Biology
Gladys Fweta	Mzuzu University	Undergraduate Student	Coding Theory
Orou Gaoue	University of Hawaii	Assistant Professor	Mathematical Biology
Innocent Harvey Gondwe	Mzuzu University	Undergraduate Student	Coding Theory
Tinade Kanyika	Mzuzu University	Undergraduate Student	Coding Theory
Roselyn Kaondera-Shava	University of Botswana	Graduate Student	Mathematical Biology
Aaron Kaunda	Mzuzu University	Graduate Student	Coding Theory
Enock Koga	University of Namibia	Lecturer	Mathematical Biology
Khumbo Kumwenda	Mzuzu University	Lecturer	Coding Theory
Hudson LaFayette	Auburn University	Undergraduate Student	Coding Theory
Benjamin Lephodisa	University of Botswana	Graduate Student	Mathematical Biology
Benjamin Levy	University of Tennessee	Graduate Student	Mathematical Biology
Kondwani Magamba	Mzuzu University	Graduate Student	Coding Theory
Ange Maloko-Mavambou	University of Kwazulu-Natal	Graduate Student	Differential Geometry
O. Maphane	University of Namibia	Graduate Student	Algebraic Topology
Theresia Marijani	University of Dar es Salaam	Lecturer	Mathematical Biology
Aaron McAtee	Auburn University	Graduate Student	Statistics
Bonnie McInnis	Auburn University	Undergraduate Student	Coding Theory
Kebareng Moalosi	University of Botswana	Graduate Student	Stochastic Analysis
Augustine Msukwa	Mzuzu University	Graduate Student	Coding Theory
Furuzan Ozbek	Auburn University	Post-Doctoral Student	Algebra
Patrick Sawerengera	University of Malawi	Graduate Student	Coding Theory
Brad Schneid	Auburn University	Graduate Student	Statistics
Abebe Regassa Tufa	University of Botswana	Graduate Student	Analysis
Sebsibe Teferi Woldeamanuel	University of Botswana	Graduate Student	Analysis

KOVALEVSKAIA RESEARCH GRANT AWARD RECIPIENTS

Name	Institution	Research Area
Beth Nyambura Kiratu	University of Nairobi, Kenya	Functional Analysis
Theresia Marijani	University of Dar es Salaam, Tanzania	Mathematical Biology

2014 MASAMU ADVANCED STUDY INSTITUTE (MASI)
FRIDAY, NOVEMBER 21— FRIDAY, NOVEMBER 28
DAILY SCHEDULE

Day 1: Friday, November 21

01:05	Arrive at Victoria Falls International Airport
02:30	Check in Hotel
03:00 – 05:00	Field Trip
05:00 – 06:00	Registration
06:00	Dinner and Group Meetings

Day 2: Saturday, November 22

09:00 – 09:30	Opening Remarks
09:30 – 10:00	Overview of Program, Logistics, Expectations
10:00 – 10:20	Break
10:20 – 12:00	Research Group Problem Sessions
12:00 – 01:30	Lunch
01:30 – 02:50	Research Group Problem Sessions
02:50 – 03:10	Break
03:10 – 04:30	Research Group Problem Sessions
04:30 – 06:00	Break
06:00	Dinner, Recap, and Networking

Day 3: Sunday, November 23

09:00 – 10:20	Research Group Problem Sessions
10:20 – 10:40	Break
10:40 – 12:00	Research Group Problem Sessions
12:00 – 01:30	Lunch
01:30 – 02:50	Research Group Problem Sessions
02:50 – 03:10	Break
03:10 – 04:30	Research Group Problem Sessions
04:30 – 06:00	Break
06:00 – 07:30	Dinner, Recap, and Networking

Day 4: Monday, November 24

08:00 – 01:00	SAMSA Conference
01:00 – 02:10	Lunch
02:10 – 03:30	Research Group Problem Sessions
03:30 – 03:50	Break
03:50 – 05:10	Research Group Problem Sessions
05:10 – 06:00	Break
06:00 – 07:30	Dinner, Recap, and Networking

2014 MASAMU ADVANCED STUDY INSTITUTE (MASI)
FRIDAY, NOVEMBER 21— FRIDAY, NOVEMBER 28
DAILY SCHEDULE

Day 5: Tuesday, November 25

08:00 – 01:00	SAMSA Conference
01:00 – 02:10	Lunch
02:10 – 03:30	Research Group Problem Sessions
03:30 – 03:50	Break
03:50 – 05:10	Research Group Problem Sessions
05:10 – 06:00	Break
06:00 – 07:30	Dinner, Recap, and Networking

Day 6: Wednesday, November 26

08:00 – 01:00	SAMSA Conference
01:00 – 02:10	Lunch
02:10 – 04:45	Research Group Problem Sessions
04:45 – 05:00	Break
05:00 – 07:00	SAMSA Annual General Meeting
07:00 – 10:00	Conference Dinner and Presentation of Kovalevskaja Research Awards

Day 7: Thursday, November 27

08:00 – 09:20	SAMSA Presentations
09:20 – 10:20	Department Chairs and Senior Research Faculty Workshop
10:20 – 10:30	Break
10:30 – 11:30	Student Development Workshop
11:30 – 09:00	Field Trip

Day 8: Friday, November 28

09:00 – 12:00	SAMSA Conference
12:00 – 02:00	Lunch

2014 MASAMU RESEARCH WORKSHOP
FRIDAY, NOVEMBER 28 — SUNDAY, NOVEMBER 30
DAILY SCHEDULE

Day 8: Friday, November 28

02:00 – 03:15	Research Presentation and Discussion
03:15 – 03:30	Break
03:30 – 04:45	Research Group Breakout Sessions
04:45 – 06:00	Break
06:00	Dinner and Discussion








Day 9: Saturday, November 29

09:00 – 10:20	Research Group Problem Sessions
10:20 – 10:40	Break
10:40 – 12:00	Research Group Problem Sessions
12:00 – 01:30	Lunch
01:30 – 05:00	Field Trip
05:00 – 06:00	Break
06:00 – 08:30	MASI Dinner

Day 10: Sunday, November 30

09:00 – 11:00	Closing Remarks and Future Plans Presentations
11:00	Hotel Check-out
11:30	Depart for Victoria Falls International Airport
01:55	Depart Zimbabwe

MASAMU PROGRAM STEERING COMMITTEE

	<p>Dr. Ash Abebe Auburn University, USA abebeas@auburn.edu</p>
	<p>Dr. Overtoun Jenda, Co-Chair Auburn University, USA jendaov@auburn.edu</p>
	<p>Dr. Peter Johnson Auburn University, USA johnspd@auburn.edu</p>
	<p>Dr. Moatlhodi Kgosimore Botswana College of Agriculture kgosimor@gmail.com</p>
	<p>Dr. Edward Lungu, Co-Chair University of Botswana lunguliz@gmail.com</p>
	<p>Dr. Sure Mataramvura University of Cape Town, South Africa sure.mataramvura@uct.ac.za</p>
	<p>Dr. Farai Nyabadza Stellenbosch University, South Africa nyabadzaf@sun.ac.za</p>

NOTES

[illegible]