



THE SAMSA MASAMU PROGRAM

<https://www.masamu.auburn.edu>

Twelfth Annual Masamu Advanced Study Institute (MASI) and Workshops in Mathematical Sciences

November 18 - 27, 2022

Maputo, Mozambique

About: Sponsored by the U.S. National Science Foundation, the Masamu 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.

Masamu Advanced Study Institute (MASI) and Workshops in Mathematical Sciences: This key component of the Masamu Program provides a platform for such collaboration. The target audiences of the MASI are graduate and undergraduate students and early career faculty (rank less than associate professor) while research workshops are open to students, faculty, and other researchers in the mathematical sciences. In order to effectively use MASI and Research Workshops, the Masamu Program has created a Collaborative Research Network (CRN) consisting of research faculty from Africa, North America, and Europe grouped into six research areas. Participants in this CRN take advantage of annual SAMSA conferences, Masamu Institutes, and Research Workshops to meet face to face, work on research problems, plan research activities for the following year, and present their research findings at the conferences. Other activities include Department Heads and Senior Research Scientists meetings and workshops in Career Development, STEM Education, and High Performance Computing. The Masamu Program is administered by the Office of Special Projects and Initiatives at Auburn University.

2022 Masamu Program Research Areas:

- Algebra
- Analysis
- Biostatistics
- Graph Theory
- Mathematical Biology
- Mathematics of Finance
- Numerical Analysis

General inquiries about the Masamu Program may be directed to:

- Dr. Overtoun Jenda, Auburn University: jendaov@auburn.edu
- Dr. Edward Lungu, Botswana International University of Science and Technology: lungue@biust.ac.bw
- Program Staff: masamu@auburn.edu

Masamu Programs: 2011 - 2019 (2020 & 2021 held virtually)



2011: Livingstone, Zambia



2012: Lilongwe, Malawi



2013: Stellenbosch, South Africa



2014: Victoria Falls, Zimbabwe



2015: Windhoek, Namibia



2016: Pretoria, South Africa



2017: Arusha, Tanzania



2018: Palapye, Botswana



2019: Blantyre, Malawi

2022 Masamu Program Research Groups

Algebra:				
Jean Baptiste Gatsinzi	Faculty	Botswana International University of Science and Technology	Botswana	In person
Meschack Ndlovu	Student	Botswana International University of Science and Technology	Botswana	In person
Oteng Maphane	Student	Botswana International University of Science and Technology	Botswana	In person
Sesuai Madanha	Faculty	University of Pretoria	South Africa	In person
Smegnsh Demealsh Yeruk	Student	Botswana International University of Science and Technology	Botswana	In person
Travis Pence	Student	University of South Carolina	USA	In person
Paul Anthony Otieno	Student	Botswana International University of Science and Technology	Botswana	Remote

Analysis:				
Anas Yusuf	Student	Federal University, Birnin Kebbi	Nigeria	Remote
Basit Ali	Faculty	University of Management and Technology, Pakistan	Pakistan	Remote
Emmanuel Nthala	Student	Mzuzu University	Malawi	Remote
Faiza Tariq	Student	University of Management and Technology, Pakistan	Pakistan	Remote
Fernando Mucomole	Student	Eduardo Mondlane University	Mozambique	Remote
Geraldo De Souza	Faculty	Auburn University	USA	Remote
Hafiza Aqsa Butt	Faculty	University of Management and Technology, Pakistan	Pakistan	Remote
Hammad Ali	Student	University of Management and Technology, Pakistan	Pakistan	Remote
Joseph Owuor Owino	Student	Technical University of Kenya	Kenya	Remote
Mokhwetha Mabula	Faculty	University of Pretoria	South Africa	Remote
Nozara Sundus	Student	Government College University, Pakistan	Pakistan	Remote
Olivier Olela Otafudu	Faculty	North-West University	South Africa	Remote
Sello Mbambo	Student	University of the Free State	South Africa	Remote
Tshikudu Lukoto	Faculty	University of Limpopo	South Africa	Remote
Yolanda Mutemwa	Student	North-West University	South Africa	Remote

2022 Masamu Program Research Groups

Biostatistics:				
Alfred Musekiwa	Faculty	University of Pretoria	South Africa	In person
Hannah Correia	Postdoc	Johns Hopkins University	USA	In person
Innocent Maposa	Faculty	University of the Witwatersrand	South Africa	In person
Jesca Batidzirai	Student	University of Kwazulu Natal	South Africa	In person
Jessica Busler	Postdoc	Harvard University	USA	In person
Jordan Eckert	Student	Auburn University	USA	In person
Knowledge Chinhamu	Faculty	University of Kwazulu Natal	South Africa	In person
Retius Chifurira	Faculty	University of Kwazulu Natal	South Africa	In person
Temesgen Zewotir	Faculty	University of Kwazulu Natal	South Africa	In person
Alphonce Bere	Faculty	University of Venda	South Africa	Remote
Geoffrey Singini	Student	University of Malawi	Malawi	Remote
Halima Twabi	Student	University of Malawi	Malawi	Remote
Inger Fabris-Rotelli	Faculty	University of Pretoria	South Africa	Remote
Maureen Moyo Chilufya	Student	University of Pretoria	South Africa	Remote
Mohanad Mohammed	Postdoc	University of Kwazulu Natal	South Africa	Remote
Nicholas Siame Adam	Student	University of Malawi	Malawi	Remote
Nobuhle Mchunu	Student	South African Medical Research Council	South Africa	Remote
Portia Nevhungoni	Student	South African Medical Research Council	South Africa	Remote
Samuel Manda	Faculty	University of Pretoria	South Africa	Remote
Zvifadzo Matsena-Zingoni	Postdoc	University of the Witwatersrand	South Africa	Remote

2022 Masamu Program Research Groups

Finance:				
Calisto Guambe	Faculty	University of Eduardo Mondlane	Mozambique	In person
Darlington Hove	Student	Mangosuthu University of Technology	South Africa	In person
Elias Mwakilama	Student	Jomo Kenyatta University	Kenya	In person
Farai Mhlanga	Faculty	University of Limpopo	South Africa	In person
Lesedi Mabitsela	Faculty	University of Pretoria	South Africa	In person
Lesiba Charles Galane	Faculty	University of Limpopo	South Africa	In person
Paul Kundai Ziwakaya	Student	Botswana International University of Science and Technology	Botswana	In person
Paulina Nangolo	Student	University of Botswana	Botswana	In person
Samuel Nuugulu	Student	University of Namibia	Namibia	In person
Siboniso Confrence Nkosi	Student	University of Limpopo	South Africa	In person
Tlou Kubjana	Student	University of South Africa	South Africa	In person
Winfrida Mwigilwa	Student	Pan African University	Kenya	In person
Elias Offen	Faculty	University of Botswana	Botswana	Remote
Eriyoti Chikodza	Faculty	Great Zimbabwe University	Zimbabwe	Remote
Hans Werner Van Wyk	Faculty	Auburn University	USA	Remote
Masimba Mutakaya	Student	Midlands State University	Zimbabwe	Remote
Nicholas Mwareya	Student	Great Zimbabwe University	Zimbabwe	Remote
Sure Mataramvura	Faculty	University of Cape Town	South Africa	Remote

2022 Masamu Program Research Groups

Graph Theory:				
Alex Alochukwu	Faculty	University of Johannesburg	South Africa	In person
Andrew Owens	Faculty	Widener University	USA	In person
Cadavious Jones	Faculty	Rust College	USA	In person
Colby Muir	Student	Auburn University	USA	In person
Kat Perry	Faculty	Soka University of America	USA	In person
Khumbo Kumwenda	Faculty	Mzuzu University	Malawi	In person
Paul Horn	Faculty	University of Denver	USA	In person
Sonwabile Mafunda	Faculty	University of Johannesburg	South Africa	In person
Zion Hefty	Student	Grinnell College	USA	In person
Brandon du Preez	Faculty	University of Cape Town	South Africa	Remote
Janet Osaye	Faculty	Alabama State University	USA	Remote
Pete Johnson	Faculty	Auburn University	USA	Remote
Stacie Baumann	Student	Auburn University	USA	Remote

Numerical Analysis:				
Abdullahi Adem	Faculty	University of South Africa	South Africa	In person
Anastacia Dlamini	Student	University of South Africa	South Africa	In person
Anotida Madzvamuse	Faculty	University of Sussex	United Kingdom	In person
Ben Muatjetjeja	Faculty	University of Botswana	Botswana	In person
Hazel Sekgothe	Student	University of Limpopo	South Africa	In person
Lazarus Rundora	Faculty	University of Limpopo	South Africa	In person
Melusi Khumalo	Faculty	University of South Africa	South Africa	In person
Motshidisi Sebogodi	Student	University of Johannesburg	South Africa	In person
Richard Kagisho	Student	University of Limpopo	South Africa	In person

2022 Masamu Program Research Groups

Mathematical Biology:				
Ash Abebe	Faculty	Auburn University	USA	In person
Edward Lungu	Faculty	Botswana International University of Science and Technology	Botswana	In person
Farai Chirove	Faculty	University of Johannesburg	South Africa	In person
Fola Agosto	Faculty	University of Kansas	USA	In person
Jane White	Faculty	University of Bath	United Kingdom	In person
John B. H. Njagarah	Faculty	Botswana International University of Science and Technology	Botswana	In person
Michael Washington	Faculty	U.S. Centers for Disease Control and Prevention (CDC)	USA	In person
Siphokazi Gatyeni	Student	University of Johannesburg	South Africa	In person
Steve Dobson	Faculty	Auburn University	USA	In person
Ben Levy	Faculty	Fitchburg State University	USA	Remote
Christina Edholm	Faculty	Scripps College	USA	Remote
David Goldsman	Faculty	Georgia Institute of Technology	USA	Remote
Ioannis Sgouralis	Faculty	University of Tennessee Knoxville	USA	Remote
Javier Arsuaga	Faculty	University of California Davis	USA	Remote
Joseph Malinzi	Faculty	University of Eswatini	Eswatini	Remote
Maruf Lawal	Student	University of Tennessee Knoxville	USA	Remote
Skylar Grey	Faculty	University of Wisconsin	USA	Remote
Suzanne Lenhart	Faculty	University of Tennessee Knoxville	USA	Remote
Williams Chukwu	Faculty	Wake Forest University	USA	Remote

Staff:				
Keri Hesson	Staff	Auburn University	USA	In person
Overtoun Jenda	Staff	Auburn University	USA	In person

2022 Masamu Program Schedule

<i>Friday, November 18</i>		
Lunch	1:00 – 2:00	Hotel
Registration	2:00 – 6:00	Hotel
Institute Planning Meetings	2:00 – 6:00	Hotel
Break and Networking	6:00 – 7:00	
Dinner	7:00 – 8:00	Hotel
<i>Saturday, November 19:</i>		
Institute	9:00 – 12:00	Campus
Lunch	12:00 – 2:00	Campus
Institute	2:00 – 5:00	Campus
Break and Networking	5:00 – 6:00	
Dinner	6:00 – 7:00	Hotel
<i>Sunday, November 20:</i>		
Institute	9:00 – 12:00	Campus
Lunch	12:00 – 2:00	Campus
Institute	2:00 – 5:00	Campus
Break and Networking	5:00 – 6:00	
Dinner	6:00 – 7:00	Hotel
<i>Monday, November 21:</i>		
One-Health Symposium	9:00 – 12:00	Campus
Lunch	12:00 – 2:00	Campus
One-Health Symposium	2:00 – 5:00	Campus
Break and Networking	5:00 – 6:00	
Dinner	6:00 – 7:00	Hotel
<i>Tuesday, November 22:</i>		
SAMSA Conference (w/ Lunch)	8:30 – 5:00	Campus
Break and Networking	5:00 – 6:00	
Dinner	6:00 – 7:30	Hotel
Institute	7:30 – 10:00	Hotel
<i>Wednesday, November 23:</i>		
SAMSA Conference (w/Lunch)	8:30 – 5:00	Campus
Break and Networking	5:00 – 7:00	
SAMSA Conference Dinner	7:00 – 10:00	To Be Determined
<i>Thursday, November 24:</i>		
SAMSA Conference (w/ Lunch)	8:30 – 5:00	Campus
Break and Networking	5:00 – 6:00	
Dinner	6:00 – 7:30	Hotel
Institute	7:30 – 10:00	Hotel

2022 Masamu Program Schedule

<i>Friday, November 25:</i>		
Excursion	To be determined	To be determined
MASI Dinner	To be determined	Hotel
<i>Saturday, November 26:</i>		
Institute	9:00 – 12:00	Campus
Lunch	12:00 – 2:00	Campus
Research Workshop	2:00 – 6:00	Campus
Dinner	6:00 – 7:00	Hotel
<i>Sunday, November 27:</i>		
Research Workshop	8:00 – 11:00	Hotel
Checkout and Networking	11:00 – 12:00	Hotel
Depart for Airport	12:00	Hotel



One Health Symposium
November 21, 2022
Program and Agenda

8:00 - 8:30	Registration
8:30 - 8:40	Overview of the Symposium: Professor Overtoun Jenda
8:40 - 8:55	Welcome Address: Dean of Faculty of Science (Prof. Jamal Daud)
9:00-10:00	Round Table 1 - Models and Public Health Moderator: Tatiana Marrufo Inacio Mandomando; Micahel Washington
10:00 - 10:30	Health Break
10:30-11:10	SESSION 1 <i>Data Driven Modelling for COVID-19 and Respiratory Illness</i> Moderator: John Njangarah Alfredo Muxlhanga; Paulo Joaquim, Vincent Bulinda; Javier Arsuaga
11:10-11:30	SESSION 2 <i>Mathematical Modelling for Malaria/HIV</i> Farai Chirove; Asha Kalula.
11:30 -12:00	Parallel Sessions 1 & 2 Discussion
12:00 - 12:40	SESSION 3 <i>Biostatistics of Other Zoonotic, Human or Animal Diseases</i> Dave Goldsman; Filomena Manjate; Assucenio Chissaque, Augusto Junior
12:40 -13:00	SESSION 4 <i>Mathematical Modelling for COVID-19 and Respiratory Illness</i> Ronaldo Texeira; Amosse Chicomo
13:00 -13:30	Parallel Sessions 3 & 4 Discussion
13:30 - 14:30	Lunch time
14:30-15:30	Round Table 2- Early Warning System and Emerging Infectious Diseases Moderator: Farai Chirove Genito Maure; Osvaldo Inlamea
15:40 -16:00	SESSION 5 <i>Malaria Data Driven Modelling</i> Moderator: Erika Rossetto Erico Langa; Americo José
16:00 – 16:10	SESSION 6 <i>Data Driven Modelling for Other Zoonotic, Human or Animal Diseases</i> Plácida Maholela
16:10 – 16:40	SESSION 7 <i>Biostatistic for COVID-19 and Other Respiratory Illness</i> Inger Fabris-Rotelli; Erika Rossetto, Manuel Bila
16:40 -17:10	Parallel Sessions 5, 6 & 7 Discussion
17:10-17:30	Health Break

17:30 – 18:00	SESSION 8 <i>Mathematical Modelling for Other Zoonotic, Human or Animal Diseases</i> Moderator: Assucenio Chissaque Fola Augusto, Jane White, John Njangarah
18:00 – 18:10	SESSION 9 <i>Malaria and Anemia Biostatistics</i> Queensley Chukwudum; Paulo Mabasso
18:10-18:30	Parallel Sessions 8 & 9 Discussion
18:30-18:40	Closing Ceremony

One Health Symposium: Schematic Program

	Data Driven Modelling	Mathematical Modelling	Biostatistics
COVID-19 and Other Respiratory Illness	An Agent-Based Model for Studying the Spread of COVID-19 in Mozambique: Pandemic Planning Implications of Population Mobility Patterns (Alfredo Muxhanga)	Modelling the Transmission Dynamics of COVID-19: Pandemic Planning Implications of Vaccine, Temporary Immunity, Asymptomatic infection, Immigrants and Environmental Transmission (Ronaldo Teixeira)	A Spatial SEIR Model for COVID-19 in South Africa (Inger Fabris-Rotelli)
	Mobility Based SEIAHR COVID-19 Pandemic Model: Case Study of Mozambique (Paulo Joaquim)	Dynamics and Optimal Control Analysis of COVID-19 Transmission Epidemic Model (Amosse Chicomo)	Influenza vaccination in children under five years of age in Brazil, 2000-2018: trend, seasonality, and impact on morbidity and mortality (Erika Rossetto)
	Application of the Modified SIR Mathematical Modeling in Vaccination of Allergic Rhinitis (Vicent Bulinda)		GIS Based Spatial Modelling of COVID-19 Incidence Rates in Mozambique (Manuel Bila)
	Using machine learning and biophysical models to predict potential spillover events from coronaviruses (Javier Arsuaga)		
Malaria/HIV	Incidence tendencies and projections of climate sensitive diseases in Mozambique (Erico Langa)	On the impact of hierarchy of resort treatment-seeking behavior on malaria infection (Farai Chirove)	Malaria mortality risk in sub-saharan Africa: demographic effects and tail analysis (Queensley Chukwudum)
	Modelling the Impact of Seasonal Climate Variability on Health Sector in Mozambique (Américo José)	An Age-Structured Model for Transmission Dynamics of Malaria with Infected Immigrants and Asymptomatic Carriers (Asha Kalula)	Analysis of the Prevalence of Anemia and Associated Factors in Children aged 6 to 59 months in Mozambique (Paulo Mabasso)
Other Zoonotic, Human or Animal Disease	Building a clinical decision-making algorithm for a One Health Knowledge Repository (Plácida Maholela)	Exploring the effects of fire on tick invasion (Fola Augusto)	Confidence Intervals for the Difference between the Success Parameters of Two Correlated Bernoulli (Dave Goldsman)
		Exploring the impact of human behaviour on the spread and control of infectious diseases: how mathematical modelling can help (Jane White)	Genomic characterization of rotavirus G3P[8] genotype from vaccinated children, reveals possible reassortment events between Human and animal strains in Manhica District, Mozambique (Filomena Manjate)
		Foot and Mouth Disease Transmission and Control in presence of environmental contamination (John Njagarah)	Rotavirus epidemiology in Nampula reveals infection in children who had contact with domestic animals (Assucênio Chissaque)
			Molecular characterization studies reveal the circulation of zoonotic protozoans among children under 5 years from the Manhica District, Southern Mozambique (Augusto Messa Jr.)

KEY INFORMATION for SAMSA 2022 in MOZAMBIQUE

Mozambique - is a southern African nation whose long coastline in the Indian Ocean is permeated with well-known beaches such as Tofo and marine parks near the coast, the Quirimbas and Bazaruto islands in Cabo Delgado and Inhambane, respectively. It is a touristic destiny that you should not miss.

SOUTHERN AFRICA MATHEMATICAL SCIENCES CONFERENCE 2020 will take place from 22 – 25 November 2022. Below are some useful information that will help you organize your trip:

Visa

Please check in advance if you need a visa to enter Mozambique. Detailed information on obtaining visas for Mozambique can be found <http://www.minec.gov.mz/index.php/viagens-e-negocios/vistos-de-entrada>. Should you require any additional information, please contact the organizational committee by sending an email to sansaopedro@gmail.com.

Conference venue

Pedagogical Complex, Main Campus, Eduardo Mondlane University, [Maputo City, Moçambique](#). This campus is located at about 1 km to Costa do Sol beach and 6.6 km to city centre through the Da Marginal Avenue

Accommodation

Maputo City offers several accommodation options near the venue. See some of these options in the following table:

<u>Hotel VIP Maputo (4 star) (3.6 km)</u>	Room: standard single 7000,00 Mt (110 USD)
	Room: standard double 7500,00 Mt (118 USD)
<u>Hotel Avenida (5 star) (2.88 km)</u>	Room: standard single 175 USD
	Room: standard double 210 USD
<u>Hotel Tivoli Maputo (3 star) (3.7 km)</u>	Room: standard single 94 USD
	Room: standard double 119 USD
<u>Hotel Indy Village (4 star)</u>	Room: standard single 118 USD
<u>Hotel Gloria (4 star) (1.12 km)</u>	Room: standard single 128 USD
<u>Hotel Terminus (4 star)</u>	Room: standard single 6000,00 Mt (94USD)
	Room: standard double 6360,00 Mt (100 USD)
<u>Hotel Stayeasy (4 star)</u>	Room: standard single 110 USD
<u>Hotel Southern Sun (5 star)</u>	Room: standard single 150 USD
	Room: standard double 180 USD
<u>Hotel Maputo (4 star)</u>	Room: standard single 3500,00 Mt (55 USD)
<u>Hotel Girassol (3.2 km)</u>	Room: standard single 100 USD

Nota: If you need some advice on selecting other options please feel free to contact us by sending an email to sansaopedro@gmail.com



Transport

If you travel to Maputo, Mozambique by air you will most certainly do so via Maputo International Airport (see map above), also known as Mavalane International Airport. The distance from the airport to conference venue is about 6 km and 7,1 km city centre by Acordos de Lusaka Avenue.



Communications

Don't be disconnected from the world! Before you travel, check that your carrier has roaming service in Mozambique. But do not worry, if you do not have it, you will be able to join the prepaid services of one of the three Mozambican mobile operators: *Tmcel*, *Vodacom* and *Movitel* upon arrival by simply purchasing an initial card and registering to the network by presenting your personal identification document.



Currency – Commercial Transactions

The most commonly used official currency in Mozambique is Metical (Mt / MZN). However, in some places you may pay in US dollars (USD) or even in Rands (ZAR - South African currency). It is important to note that at the moment most merchants offer the possibility of payment using certain cards, such as VISA and Mastercard. It is also noteworthy that the banking network in Maputo City is quite extensive, so that you can very easily have access to an ATM to withdraw cash in local currency (Mt).



We look forward to seeing you in Maputo!

SOUTHERN AFRICA MATHEMATICAL SCIENCES ASSOCIATION ANNUAL CONFERENCE

Mathematical Sciences for Technology Innovation and Human Development

November 22 - 25, 2022

UEM Main Campus, Maputo

The Faculty of Science of Eduardo Mondlane University (UEM) is organising the 2022 annual SAMSA conference. This conference will create a platform for the dissemination of research ideas and results, networking among mathematical scientists and present an opportunity for upcoming researchers to engage with seasoned experts in the mathematical sciences.

In collaboration with Auburn University, UEM is also organising the 2022 Masamu Advanced Study Institute (MASI) and workshops from November 18 to November 27, 2022 on the sidelines of the SAMSA conference. For more information about Masamu program and how to participate, please visit <https://masamu.auburn.edu/>.

In the sidelines of the SAMSA 2022 annual conference, UEM will also host the One Health Symposium to celebrate the 10th anniversary of the US-Africa Collaborative Research Network in Mathematical Sciences to be held on Monday 21 November 2022. For further details visit the conference webpage <https://samsa2022.uem.mz>.

General Information: Detailed and up to date information is available on the conference website <https://samsa2022.uem.mz> and SAMSA website, <http://samsa-math.org/>.

Topics: Presentations at the conference will cover all fields of Mathematical Sciences, including but not limited to, Algebra, Analysis, Geometry, Fluid Dynamics, Discrete Mathematics, Financial Mathematics, Mathematical Biology, Mathematics for Industry, Mathematics Education, Theoretical Physics, Statistics, Data Science, Machine Learning and Artificial Intelligence.

Abstract and/or Paper Submission: Abstracts must be prepared in LATEX using the template that is provided on the conference website and should be sent to samsa.2022@uem.ac.mz.

Registration: There will be a conference registration fee of US\$250. Students will be required to pay a subsidised registration fee of US\$150 provided they present their valid student identification card.

Accommodation: Detailed information about accommodation is available on the conference website.

Invitation/Acceptance Letters for Visa Purposes: If your abstract has been accepted and you require a visa to enter Mozambique, send a copy of the first page of your passport to samsa.2022@uem.ac.mz.

Important Dates and Deadlines

- **April 01, 2022:** Pre-registration and abstract submission open
- **September 16, 2022:** Deadline for submission of abstracts
- **October 22, 2022:** Deadline for submission of papers for conference proceedings
- **November 22-25, 2022:** SAMSA2022 Conference dates

Contact Details: Sansão Pedro (LOC Chairperson, sansao.pedro@uem.ac.mz);
Calisto Guambe (LOC Secretary, calisto.guambe@uem.ac.mz);