AIBBC Africa International Biotechnology and Biomedical Conference
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Workshop and Symposium on Capacity Building for National Sustainable Development

"*Title:* From Evidence generation through effective lab diagnosis and disease prediction strategies to effective implementation of findings."

6-17 August 2018 – Nairobi, Kenya

Provisional Programme

SUMMARY OF COURSES

Track 1: Laboratory diagnosis for effective disease diagnosis and generation of evidence-based clinical data.

- This course will be conducted in the context of **antimicrobial stewardship** and **diagnostic stewardship** in low resource settings, designed for ***medical doctors and pharmacists*** on one hand and ***laboratory technologists and biomedical scientists*** on the other hand respectively.

Track 2: Climate change and mathematical modelling of infectious diseases and use of climate information in health decision-making.

- This track will involve **operational side of climate health** and **mathematical modelling of diseases** for early prediction of disease outbreaks. The course will involve climate scientists in health management on one hand and epidemiologists and biostatisticians on the other hand.

Track 3: Translation of evidence based data into policy and programs (**Implementation Research**).

- This track in the second week will involve all participants in Track 1 and 2 as well as policy and program implementers and social scientists in the East African region. The course will be delivered in the context of **lectures with hands on examples** and **panel discussions** in form of a symposium.

	Course title	Instructors
1	Laboratory diagnosis for effective disease diagnosis and generation of evidence-based clinical data	**Week 1**
1.1	**Diagnostic stewardship in low resource settings (25 participants)**	**Week 1**
	• Point of care diagnostics in resource limited settings • Diagnostic pathway and good clinical practice (Case study of patient management at Agakhan University Hospital, Nairobi) • Evaluation of diagnostic systems under limited logistical conditions • Bioinformatic tools • Practical components: *microfluidics and diagnostic detections*	• Prof. Gunturu Revathi *(Agakhan University Hosp (Nairobi, Kenya)* • Prof. Dr. Matilu Mwau *(Kenya Medical Research Institute, Nairobi)* • Prof. Kennedy Okeyo *(Kyoto University, Japan)* • Dr. Jacqueline Linnes *(Purdue University, USA)* • Prof. Achyut Sapkot (*National Institute of Technology - Kisarazu College, Japan)* • Dr. Eddy Odari *(Jomo Kenyatta University of Agriculture and Technology, Nairobi)*
1.2	**Antimicrobial stewardship in low resource settings (25 participants)**	**Week 1**
	1.2.1. Workshop on Infection Prevention and Control	

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		• Beyond Culture and Sensitivity: the future of ASP, Microbiology and Infection Control • An understanding of the value of Behaviour Change Science to improve antibiotic prescribing • Introductions: Poll audience for current resources/ activities/ patient populations served/ priorities • Hand Hygiene (HH): *How are we doing and how we can improve?* • Device-related infections: process and outcome measures u*sing evidence-based bundles and monitoring central line associated bloodstream infections (CLABSIs) and catheter-associated urinary tract infections (CAUTIs)* • Surgical site infections: Challenges of implementing bundles and outcomes: *Winning the hearts and minds of the interdisciplinary perioperative care teams* • Practical component: - Group Discussion 1: Surveillance strategies for healthcare-associated infections (HAIs): - Group discussion 2: Direction forward	• Prof. Dr. Dr. Lisa Saiman *(Columbia University College, USA)* • Prof. Dr. Elaine Larson *(Columbia University Medical Center, USA)* • Prof. Dr. Emily A. Rogena *(Jomo Kenyatta University of Agriculture and Technology, Nairobi)* • Dr. Celestine Makobe *(Jomo Kenyatta University of Agriculture and Technology, Nairobi)*
		1.2.2. Workshop on Antimicrobial Stewardship • Introductions: Poll audience for current resources/ activities/ patient populations served/ priorities • What is antimicrobial stewardship and why do we need it? • Evidence strategies for antimicrobial stewardship: what works and doesn't work • The Antimicrobial Stewardship Team • An understanding of the value of Behaviour Change Science to improve antibiotic prescribing Practical component: • Group discussion 1: Surveillance to demonstrate effectiveness of antimicrobial stewardship • Group discussion 2: Direction forward	• Prof. Dr. Elaine Larson *(Columbia University Medical Center, USA)* • Prof. Dr. Lisa Saimon *(Columbia University Medical Center, USA)* • Dr. Serah Kaggia *(Jomo Kenyatta University of Agriculture and Technology, Nairobi)* • Dr. Celestine Makobe *(Jomo Kenyatta University of Agriculture and Technology, Nairobi)*
	1.3	**Common topics in diagnostic and antimicrobial stewardship** **(50 participants)**	**Week 1**
		• An understanding of the value of Behaviour Change Science to improve antibiotic prescribing • How novel diagnostics can help in clinical decision making for antibiotic prescribing	• Prof. Gunturu Revathi *(Agakhan University Hosp (Nairobi, Kenya)* • Prof. Dr. Lutz Guertler *(Max von Pettenkofer-Institute, Germany)* • Dr. Eddy Odari *(Jomo Kenyatta University of Agriculture and Technology, Nairobi)* • Dr. Celestine Makobe

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			(Jomo Kenyatta University of Agriculture and Technology, Nairobi)
2	Climate change, mathematical modelling of infectious diseases and use of climate information in health decision-making		**Week 1**
	2.1	**Operational side of climate health (25 participants)**	**Week 1**
	Climate information for public health action. This track will explore the use of climate knowledge, data, methods, tools in health decision-making in the IGAD region with a focus on infectious disease, hydro-meteorological disasters and nutrition. It will introduce climate products and services being made available through web enabled Maprooms of ICPAC and the regions National Meteorological and Hydrological Services. 1. Climate and Health, the policy context 2. Climate impacts on health 3. Climate information in health decision-making 4. Introduction to Maproom climate services and other climate information sources - historical climate, climate monitoring, ENSO impacts, seasonal climate forecasts. 5. Practical exercises		• Prof. Dr. Madeleine C. Thomson *(International Research Institute for Climate and Society (IRI) - Columbia University, USA)* • Dr. Solomon Nzioka *(WHO - Kenya office)* • Dr. David Gikungu *(Kenya Meteorological Department)* • Dr. Angel Munoz *(International Research Institute for Climate and Society (IRI) - Columbia University, USA)* • Dr. Paulino Omay *(ICPAC, Kenya)*
	2.2	**Mathematical modelling of diseases (25 participants)**	
	Introduction to R language Working with climate information SEIR modelling		• Dr. Nakul Chitnis *(Swiss Tropical and Public Health Institute, Switzerland)* • Dr. Jane Aduda *(Jomo Kenyatta University of Agriculture and Technology)* • Dr. Felipe Cólon *(Tyndall Centre University of East Anglia, UK)* • Ana Menezes *(Climate Change Economist)*
3	Translation of evidence based data into policy and programs.		**Week 2**
	3.1	Implementation Research	
	• Introduction to implementation research and multi-sectoral involvement into Implementation research • Quality improvement as a management tool • Dissemination research and social marketing • Policy development, implementation and stakeholder involvement in health programs - Stakeholder and policy analyses - From research to policy: examples from Kenya		• Prof. Dr. Elizabeth Bukusi *(Kenya Medical Research Institute, Nairobi)* • Dr. Adugna Woyesa *(Ethiopian Public Health Ministry)*
	3.2	Symposium Day 1	**Week 2**
	- **Session (one)** WHO/JEE health security assessments of and upscaling epidemic preparedness for Eastern and Southern Africa.		• Prof. Dr. Madeleine C. Thomson *(International Research Institute for Climate and Society (IRI) - Columbia University, USA)*

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	Global Health Security Agenda and Children - **Poster Presentation** - **Session (two)** - Climate information and health system	• Dr. Wilmot James *(Columbia University Medical Center, USA)* • Prof. Gunturu Revathi *(Agakhan University Hosp (Nairobi, Kenya)* • Prof. Dr. Lawrence Stanberry *(Columbia University Medical Center, USA)* • Vice Chancellor *(Jomo Kenyatta University of Agriculture and Technology)*
	DAY 2 Symposium	
	- **Session (one)** Framework, funding and governance on multi-disciplinary disciplinary antimicrobial stewardship Establishing strong multi-disciplinary - multi-sectoral collaborations (Experiences and lessons learnt) - **Poster Presentation** - **Session (Two)** Linking Academia and Industry in Research and Innovation (Practical lessons) Ideal partnerships as opportunities to young researchers (where we are and where we ought to be...Experiences from Japan) **Closing ceremony**	• Prof. Dr. Lutz Guertler *(Max von Pettenkofer-Institute, Germany)* • Prof. Dr. Lawrence Stanberry *(Columbia University Medical Center, USA)* • *Prof. Dr. Kevin Marsh* *(Africa Academy of Sciences)* • Vice Chancellor *(Jomo Kenyatta University of Agriculture and Technology)*

Course outlines

Course 1.1

Title: **Diagnostic stewardship in low resource settings**

Summary

The concept of “diagnostic stewardship” at surveillance sites is an important component of Antimicrobial Resistance (AMR) surveillance in humans as well as in the overall AMR control strategy. The course will focus on three major sub-themes. POC diagnostics are poised to reshape the delivery of healthcare system in both high-resource and resource limited settings. Under the subtheme, Rapid diagnostic Testing in Antimicrobial Stewardship (*promise and potential, roles, established methods, unmet needs and RDT methodologies*) will be explored. In diagnostic pathway and good clinical practice, topics covered will include specimen selection and collection, turnaround time, specimen storage and transport, pre-analytical specimen management at the point of care, lab processing including feedback and reporting strategies will be covered from the routine experiences a university referral hospital. The final sub-theme on evaluation of diagnostics under limited logistical conditions will focus on analytical as well as clinical validation of systems, how to reduce false positive results, monitoring the process and outcome of testing on patient care to identify potential unintended consequences, costs, effects on AMR rates, and opportunities to enhance the availability of rapid diagnostic testing in low-resource setting.

On the practical bit, the participants will be exposed to microfluidic technologies which integrate complex biochemical analyses into automated systems for resource-limited settings. A focus will be made on fundamental microfluidics as theory and the information integrated into hands-on experiments on

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fabrication and testing microfluidic devices as investigate the current products and future directions in point of care diagnostics.

Who should attend?

Our target audience includes medical laboratory technologists, clinicians, nurses, individuals interested in acquiring or expanding their knowledge in the emerging field of point-of-care diagnostics including graduate students and postdocs, scientists, and biomedical engineers interested in the field of infectious disease detection with a focus on microfluidic and paper-based technologies.

Benefits to attendees

The course will give several practical insights into disease diagnosis and best practices to control resistance and nosocomial infections at hospital level. The component of diagnostics and their evaluation will highlight the concept of POC and their application in screening and diagnosis under limited resources. The hands-on experience including device fabrication, available options and future directions will incite discussions on the usefulness of micro-and nanotechnology for a given biological problem at point of care. Participants will gain hands on experience on fabricating microfluidic devices and will be able to identify major targets, sample matrices and preparation requirements as well as methods of detection and signal amplification.

Contents for practical part of the course

Introduction to POC diagnostics in resource-limited settings

Basic background in microfluidics and diagnostic detection (e.g. laminar flow defines mixing, sample sources/matrices, sample preparation requirements, signal types (visual, fluorescent, electrochemical), increasing signal-to-noise ratio)

Hands on device fabrication (e.g. soft lithography, wax barriers in paper)

Hands on testing of current technologies (e.g. Lateral flow rapid diagnostics, Cephiad GeneExpert)

Discussion of future POC technology directions (e.g. omics, syndromic management, multiplex detection of numerous pathogens, field-based molecular diagnostics in paper)

Presenter Biography

Prof. Gunturu Revathi is Professor of clinical Microbiology at the Aga Khan University Hospital, Nairobi and visiting faculty at the University of Nairobi and the Jomo Kenya"a University of Science and Technology. She worked in the Cytology Research Center at the Maulana Azad Medical College, and Dept. of Microbiology, the University College of Medical Sciences, New Delhi, before moving to Kenya. She headed the department of laboratory medicine at the Kenya"a National Hospital for a number of years while being a faculty member of the Department of Medical Microbiology at the College of Health Sciences, University of Nairobi. Prof Revathi supervised around 50 post graduate thesis projects and published 80 papers in peer reviewed journals. She is a member of several national and international professional bodies such as ISID, ESCMID, KACP, APECSA, and ERS. She is a member of various National commitees such as Technical advisory committee for National Program for Tuberculosis and Leprosy, National committee on Infection prevention and control, National Antimicrobial Stewardship committee, Kenya National committee on Infectious and Parasitic Diseases Research Program (IPDRPC), National working group for Clinical Management and Referral guidelines of Ministry of Health, Global Antimicrobial resistance Partnership (GARP) to menon some of them.

Prof. Dr. Matilu Mwau is a professor of immunology and infectious diseases research at the Kenya Medical Research Institute. Between 2013 and 2014, he was Associate Professor in Medical Microbiology, Jomo Kenyatta University of Agriculture and Technology. He is a Visiting Professor, Nagasaki University, and was the Executive Director, Consortium for National Health Research (CNHR), 2014-2016. He holds a degree in medicine and surgery from the University of Nairobi, a Master's degree in Tropical Medicine from Nagasaki University and a Doctorate Degree in Clinical Medicine (Immunology) from Oxford University.His infectious diseases research revolves around HIV, hepatitis and arthropod borne viruses, and he has published extensively in these areas.Outside of his interest in infectious diseases, he is a health systems strengthening specialist. His most recent consultancies have focused on Quality of Health Improvement.
Matilu has mentored several Master degree and doctorate degree students at local and international

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universities.

Dr. Kennedy O. Okeyo is currently a senior lecturer at the Institute for Frontier Life and Medical Sciences, Kyoto University. He graduated with a PhD in mechanical science and engineering from Kyoto University, Japan, in 2010, and thereafter worked for two years at the Hitachi Central Research Laboratory. He then became an assistant professor at the Department of Mechanical Engineering, The University of Tokyo, Japan, where he worked from 2012 to 2017 before assuming his current position. His major research interests include stem cell engineering, bioMEMS, microfluidics, and cell biomechanics of cell migration. He has extensive experience in microfabrication of micro-devices for cell function manipulation and research.

Prof. Dr. Philip Larussa is a professor of Pediatrics at Columbia University Medical Center in the Division of Pediatrics Infectious Diseases. He is an authority on herpes virus infections in childhood, pediatric HIV, and immunization efficacy and safety issues. He has collaborated on global health capacity building and research projects in Uganda, South Africa, Zimbabwe, Ethiopia and Vietnam. He has authored/ co-authored over 150 scientific papers in peer-reviewed journals, and over 20 chapters in books and has served on numerous national and international advisory panels.

Dr. Achyut Sapkota is currently an Associate Professor of Information and Computer Engineering at National Institute of Technology, Kisarazu College, Japan. He received his doctoral degree in information systems engineering from Osaka Sangyo University, Japan in 2009. He worked as postdoctoral research associate at Institute of Systems Biology, Shanghai University, Shanghai from 2009 to 2010, and at Nihon and Chiba University, Japan from 2010 to 2011. He was JSPS postdoctoral fellow from 2011 to 2013. He worked as Assistant Professor in Chiba University from 2013 to 2015. His research interests include sensor development, biomedical signal processing, bioinformatics and biological data visualization.

Dr. Jacqueline Linnes is Assistant Professor of Biomedical Engineering at Purdue University in West Lafayette, Indiana, USA. Her laboratory develops real-time detection technologies to prevent, diagnose, and better understand the pathogenesis of diseases. She focuses on non-invasive sample collection and rapid detection of pathogens and biomolecules to efficiently diagnose a variety of environmental, bacterial, and viral pathogens at the point of care.

Course 1.2

Title: **Antimicrobial stewardship in low resource settings**

Summary

It is without any doubt that antibiotic use has a potential grave negative consequences in public health since inappropriate use may not only harm an individual user, but contributes to societal harm by exerting an unnecessary selective pressure that lead to antibiotic resistance among bacteria. In this course the major components of ASP and how they integrate with each other as well as how ASP is and how it can be implemented in hospital setting will be explored. In exploring mechanisms of bacterial resistance, antimicrobial resistance and its global impact with appropriate examples will be covered. Under the subtheme "best practices and appropriate pharmacotherapy" the relationship between antibiotic resistance and prescribing, how measurements can be used to improve prescribing of antibiotics as well as examples of successful antibiotic stewardship programs have been undertaken globally. The latter will involve active group participations.

Who should attend?

Our target audience includes clinicians, section heads/ managers in hospitals, nurses, individuals interested in acquiring or expanding their knowledge on ASP methodologies, medical students and interns as well as members of the county health management teams.

Benefits to attendees

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This course will offer the participants an opportunity to assess the threat of antibiotic resistance in their location and to their practice. With the practical examples of successful ASP across the globe, participants will get an opportunity to assess the applicability of such programs and encouraged to explore the value of such programs in their own locations. They will be able to evaluate the effectiveness of using certain strategies/tools/interventions in antimicrobial stewardship to drive improvement in their location and practice. Further the practical element will enable them understand the value of measurement in antimicrobial stewardship i.e. how to calculate DDDs and use Point Prevalence Surveys and to determine how to use these in their location and practice in order to drive improvements in antibiotic prescribing

Presenter Biography

Dr. Wilmot James is visiting professor of pediatrics (non-clinical) and international affairs at Columbia University. Between 2009 and 2017 he served as a Member of Parliament (South Africa), most recently serving the health portfolio. His research interests are in methodologies for assessing epidemic preparedness and health security and diplomacy policy and practice. Trained as a sociologist, he is the author of 3 and editor or co-editor of 14 books, including Biotechnology and Health: South Africa's Aspirations (2007). He served as a Trustee of the Ford Foundation between 1996 and 2008.

Dr. Elaine Larson is Associate Dean for Research and the Anna C. Maxwell Professor of Nursing Research, Columbia University School of Nursing and Professor of Epidemiology at the Mailman School of Public Health. Dr. Larson has been a member of the Board of Directors of the National Foundation for Infectious Diseases and the Report Review Committee, National Academy of Sciences. She is, among others, a Fellow of the Association of Professionals in Infection Control and Epidemiology and the Director of the Center for Interdisciplinary Research to Prevent Infections at Columbia. She has published more than 400 journal articles, four books and a number of book chapters in the areas of infection prevention, epidemiology, and clinical research and has served as a consultant in infection control and nursing in international settings.

Dr. Philip Larussa is Professor of Pediatrics at Columbia University Medical Center in the Division of Pediatrics Infectious Diseases. He is an authority on herpes virus infections in childhood, pediatric HIV, and immunization efficacy and safety issues. He has collaborated on global health capacity building and research projects in Uganda, South Africa, Zimbabwe, Ethiopia and Vietnam. He has authored/ co-authored over 150 scientific papers in peer-reviewed journals, and over 20 chapters in books and has served on numerous national and international advisory panels.

Dr. Lisa Saiman is a professor of pediatrics at Columbia University Medical Center and an attending physician at New York-Presbyterian (NYP) Morgan Stanley Children's Hospital. Her primary research and clinical interests are the infectious disease and microbiology issues in people with cystic fibrosis and healthcare-acquired infections, multidrug-resistant pathogens, and antimicrobial stewardship, particularly as related to infants hospitalized in the neonatal ICU. Dr. Saiman received her medical degree from Albert Einstein College of Medicine in the Bronx, New York City, and her Masters of Public Health and Epidemiology from the Mailman School of Public Health at the CUMC in 1999.

Dr. Lawrence R. Stanberry is the Reuben S. Carpentier Professor and Chairman of the Department of Pediatrics at the College of Physicians and Surgeons at Columbia University and Pediatrician-in-Chief of the NewYork-Presbyterian/ Morgan Stanley Children's Hospital. He is an authority on viral diseases, perinatal infections, sexually transmitted diseases and vaccine, antiviral, and topical microbicide development. He has authored over 200 scientific articles and authored/edited 9 books including Vaccines for Biodefense and Emerging and Neglected Diseases (London, 2009) and Viral Infections of Humans: Epidemiology and Control, 5th Edition (New York, 2014).

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Title: **Common topics in diagnostic and antimicrobial stewardship**

Summary

This component will bring together participants of 1.1 and 1.2 with the aim of highlighting the importance of the two groups in diagnosis and treatment as a component in ASP. The element of behaviour change communication on antimicrobial use will be stressed and methodologies strengthened. Infections control remain a core component in microbiology and public health just as effective diagnosis is core to treatment and management of diseases.

Presenter Biography

Prof. Wilmot James is a visiting Professor to Columbia and, until recently a member of the South African Parliament and the official opposition spokesperson on health. Past portfolios were trade and industry, science and technology and schools and higher education. Dr. James's primary focus of policy research currently is global health security and diplomacy, and among many global threats he has recently analyzed worldwide responses to HIV/AIDS, Ebola, and the Zika virus. Dr. James has been involved in public policy work dealing with immigration, electoral reform, education, trade, science and technology and health. He holds a Ph.D. from the University of Wisconsin-Madison, was a Fellow in South African history at Yale University and the Gordon Moore Distinguished Visiting Professor at the California Institute of Technology. He is the author and/or editor of 17 books, including Nature's Gifts: Why we are the way we are (Johannesburg, 2010, WITS University Press).al research in support of large-scale health interventions, mostly in Africa.

Prof. Dr. Dr. h.c. Lutz Guertler is a professor of virology with a specialization in Anthropology, Human Genetics, Microbiology and Hygiene. He is the Emeritus head of the Institute of Medical Microbiology of the University of Greifswald and currently a visiting professor of the Max von Pettenkofer institute in Munich - Germany. He discovered HIV subtype O and over time has conducted numerous studies on the variability of "O viruses". From 1986 he was committed to the establishment of reference laboratories for HIV diagnostics in Africa and currently serves as a visiting professor of Virology and Bacteriology at the University of Bangangté in Cameroon.

Course 2.1

Title**: Operational side of climate health**

Summary

Climate is one of many drivers (e.g., social, political, economic, environmental, and technological factors) of health outcomes that is measured outside of the health sector. What makes it unique is the fact that it is routinely measured modeled and predicted at a local and global scale using standardized methodologies. It varies by location according defined processes and has distinct cycles – day and night, season, as well as natural climate cycles driven by phenomena such as the El Niño Southern Oscillation.

Climate is measured and monitored in a systematic National Meteorological Agencies and specialist global centers using meteorological stations, satellite sensors and global models. Climate information, based on analysis of historical data, monitoring of current conditions or predictions of future weather or climate events and trends, can inform public health policy and planning.

This course will introduce participants to the use of climate data and information in health decision-making with an emphasis on understanding the critical criteria that can enable data to drive decisions i.e. data that are "accurate; timely; relevant; complete; interpretable; consistent representation; accessible; traceable; easy to use" (Kennerley and Mason 2008). It will also provide an introduction to the powerful IRI, ICPAC and national ENACTS Maprooms and tailored tools for use in disease control planning, surveillance and early warning.

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Who should attend?

The target audience includes individuals interested in acquiring or expanding their knowledge on climate health methodologies, medical professionals and students as well as members of the county health management teams.

Benefits to attendees

Students who successfully complete this course will be able to;

- Recognize the climate and environmental drivers of climate sensitive health outcomes at different timescales (weather, seasonal, decadal and long term change) and their relationship to the time and space scales of health decision-making
- Understand critical differences between climate data sources that can be used in health decision-making – focussing on rainfall and temperature
- Access climate products from IRI, ICPAC and National Meteorological Agencies global and ENACTS Maprooms and explore their utility in health decision-making at seasonal timescales
- Identify opportunities for improved health outcomes that may result from the use of appropriate climate and environmental information in health decision-making. including planning, surveillance and early warning
- Apply knowledge, data methodologies and tools obtained through this course to their own projects or areas of interest and prepare poster for conference
- Consider what additional climate information products might be developed for specific health actions
- Communicate their knowledge to appropriate policy relevant climate informed decision-making processes.

Prerequisites

Basic familiarity with word excel. GIS, R programming an advantage

Workshop structure

The course combines expert lectures, panels, round table discussions hands on practical sessions and break-out group work. Workshop activities will culminate in individual and or groups submitting a poster to the final conference

Presenter Biography

Dr. Madeleine Thomson, Ph.D. is a Senior Research Scientist at the International Research Institute for Climate and Society and Senior Scholar at the Mailman School of Public Health at Columbia University. She directs the IRI/PAHO-WHO Collaborating Center (US306) for Early Warning Systems for Malaria and Other Climate Sensitive Diseases. Her research focuses on the development of new data, methodologies and tools for improving climate sensitive health interventions. Her focus has been on vector-borne diseases but in recent years has expanded to include air and water-borne infections as well as broader health challenges associated with food security/nutrition and disasters. She is developing a health and climate interface and a climate smart public health community through the Climate Information for Public Health Action Initiative.

Course 2.2

Title: **Mathematical modelling of diseases**

Summary

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Many infectious diseases are characterised by complex transmission dynamics, making it difficult to predict their spread and the impact of control interventions. Mathematical models can help to elucidate the dynamics of these diseases, improve our understanding of key processes and assist in making predictions of disease incidence and facilitate decision making for prevention and control.

In this lecture, students receive an introduction to the principles of infectious disease modelling. The lecture requires an understanding of basic calculus and it will be necessary during the course to manipulate equations and implement them in software. The course is suitable for students interested in the general principles of pathogen modelling as well as those who intend to carry out projects in this area.

Who should attend?

The target audience includes individuals interested in acquiring or expanding their knowledge on the application of mathematical modelling of infectious diseases, medical professionals and students as well as members of the county health management teams.

Benefits to attendees

Students who successfully complete this course will be able to;

- Write routines in R.
- Derive and understand simple models of infectious disease dynamics
- Simulate such models in R.
- Work with climate information
- Incorporate climate information into disease models.

Prerequisites

Basic familiarity with calculus and the ability to manipulate equations. R programming an advantage.

Workshop structure

The course combines expert lectures, computer lab assignments, panels, hands on practical sessions and break-out group work. Workshop activities will culminate in individual and or groups submitting a poster to the final conference

Presenter Biography

Dr. Nakul Chitnis is a Group Leader in Mathematical Epidemiology at the Swiss Tropical and Public Health Institute. His background is in mathematics and his main areas of activities lie in developing and analysing mathematical models to answer questions of public health relevance. He has used various types of models ranging from population-based difference and differential equations to stochastic individual based models to analyse the dynamics of malaria and neglected tropical diseases, including opisthorchiasis, rabies, sleeping sickness and lymphatic filariasis.

Ana Menezes holds a MSc Environmental Sciences with focus on Climate Change from the University of East Anglia, UK, a MSc Development Studies from the University of Antwerp, Belgium and a BSc Economics from the Federal University of Pernambuco, Brazil. Her research focus on the socio-economic impacts of Climate Change in regards to health outcomes.

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Title: **From research findings to policies and programs (implementation research)**

Summary

Although a tremendous growth has been seen in knowledge base on evidence-based practices in social work and medicine, there is still exists a wide gap between what is known and what is routinely done (i.e. the Know-do gap). It is needless to mention that there still is a dire need for better research to inform decisions about health policies, programmes, and practices. Implementation research course will therefore enlighten the participants on the methodologies for uptake of research findings into routine practice. It will enable the learners understand how to use the data they generate everyday into implementable programs or effective policies.

This course will start by introducing implementation research and explore on how it can be implemented in a multi-sectoral set up - under this the participants will experience a practical experience on how to improve quality as a management tool. Further methodologies on dissemination of research findings through social marketing will be explored. Policy development and how findings have influenced policies and practice will me described and a number of practical cases (examples) presented to the learners. Finally the participants will be exposed to the framework, funding and other components related to multi-sectoral program implementations.

Who should attend?

All participants in week one including program managers, heads of various government agencies, social scientists as well as other persons interested in understanding or expanding their knowledge on implementation research.

Benefits to attendees

This course will offer the participants an opportunity to understand how to use their every day experiences for improvement of their programs. Further scientists and researchers will understand the best strategies to use in communicating their findings to guide in policy development. It is envisaged that after this training, the participants will improve their negotiation skills with regards to having their findings in research inform policy developments both locally and globally.

Presenter Biography

Prof. Dr. Elizabeth Bukusi is a proffessor of Epidemiology and research ethics and is currently a Chief Research Officer at the Kenya Medical Research Institute (KEMRI) , a Research Professor at the University of Washington (Departments of Obstetrics and Gynecology and Global health), an honorary lecturer at Aga Khan University in Nairobi (Department of Obstetrics and Gynecology) and Volunteer Clinical faculty – Professor at the University of California San Francisco (Department of Obstetrics, Gynecology & Reproductive Sciences). Her primary areas of interest in research focus on sexually transmitted infections, reproductive health, and HIV prevention, care and treatment and she has a keen interest in research and clinical ethics/ research regulatory systems.

Prof. Wilmot James is a visiting professor of pediatrics (non-clinical) and international affairs at Columbia University. Between 2009 and 2017 he served as a Member of Parliament (South Africa), most recently serving the health portfolio. His research interests are in methodologies for assessing epidemic preparedness and health security and diplomacy policy and practice. Trained as a sociologist, he is the author of 3 and editor or co-editor of 14 books, including *Biotechnology and Health: South Africa's Aspirations* (2007). He served as a Trustee of the Ford Foundation between 1996 and 2008.

WEEK 1

Topic 1 - Laboratory diagnosis for effective disease diagnosis and generation of evidence-based clinical data

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Monday, 6 August 2018

Monday, 6 August 2018	**08:30 – 09:00**	Registration	
	09:00 – 10:30	Opening session	
	10:30 – 11:00	Coffee break	
	11:00 – 11:30	**Track 1.3 Common topic (Diagnosis/Diagnostic group)** Title: Introduction to Antimicrobial Stewardship - a new focus? Room: SarJ - Hall Instructor: Prof. Gunturu Revathi	
	11:30 – 12:45	**Track 1.1 Diagnostic stewardship in low resource settings** Title: Point of care diagnostics in resource limited settings (General introduction) Room: SarJ - Room 1 Instructor: Dr. Jacqueline Linnes/ Prof. Kennedy Okeyo	**Track 1.2 Antimicrobial stewardship in low resource settings** Title: Introductions:Beyond Culture and Sensitivity: the future of ASP, Microbiology and Infection Control Room: SarJ - Room 2 Instructor: Prof. Gunturu Revathi
	12:45 – 13:50	Lunch break	
	14:00 – 16:00	**Track 1.1 Diagnostic stewardship in low resource settings** Title: .Point of care diagnostics in resource limited settings (RDTs) Room: SarJ - Room 1 Instructor: Dr. Jacqueline Linnes/ Prof. Kennedy Okeyo	**Track 1.2 Antimicrobial stewardship in low resource settings** Title. An understanding of the value of Behaviour Change Science to improve antibiotic prescribing Room: SarJ - Room 2 Instructor: Prof. Dr. Emily Rogena
	16:00 – 16:30	Coffee break	
	16:30 – 17:00	Rick up sessions (optional)	

Tuesday, 7 August 2018

Tuesday, 7 August 2018	09:00 – 10:30	**Track 1.3 Common topic (Diagnosis/Diagnostic group)** Title: How novel diagnostics can help in clinical decision making for antibiotic prescribing Room: TBC Instructor: Prof. Matilu Mwau	
	10 :30 – 11:00	Coffee break	
	11 :00 – 12:45	**Track 1.1 Diagnostic stewardship in low resource settings** Title: Point of care diagnostics in resource limited settings (Practical sessions) Room: SarJ - Lab Instructor: Dr. Jacqueline	**Track 1.2 Antimicrobial stewardship in low resource settings** Title: Current trends in HIV diagnosis, treatment and safety issues Room: SarJ - Room 2 Instructor: Prof. Lutz Guertler

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		Linnes/ Prof. Kennedy Okeyo/Dr. Eddy Odari	
	12:40 – 13:50	Lunch break	
	14:00 – 16:00	**Track 1.1 Diagnostic stewardship in low resource settings** Title: Point of care diagnostics in resource limited settings (Practical sessions) Room: SarJ - Lab Instructor: Dr. Jacqueline Linnes/ Prof. Kennedy Okeyo/Dr. Eddy Odari	**Track 1.2 Antimicrobial stewardship in low resource settings** Title: Summary of Good Clinical Practice Room: SarJ - Room 2 Instructor: Prof. Lutz Guertler
	16:00 – 16:30	Coffee break	
	16:30 – 17:00	Rick Up (optional)	

Wednesday, 8 August 2018

Wednesday, 8 August 2018	09:00 – 10:30	**Track 1.1 Diagnostic stewardship in low resource settings** Title: Introduction to Biomedical Engineering (Electrical Impedance Technology) Room: SarJ - Room 1 Instructor: Prof. Eng. Masa Takei	**Track 1.2 Antimicrobial stewardship in low resource settings** Title 1: Introductions: Poll audience for current resources/ activities/ patient populations served/ priorities Title 2: What is antimicrobial stewardship and why do we need it? Room: SarJ - Room 2 Instructor: Prof. Dr. Elaine Larson/ Prof. Lisa Saiman/ Dr. Celestine Makobe
	10 :30 – 11:00	Coffee break	
	11 :00 – 12:45	**Track 1.1 Diagnostic stewardship in low resource settings** Title: Introduction to Biomedical Engineering (Electrical Impedance Technology - practical session) Room: SarJ - Room 1 Instructor: Prof. Eng. Masa Takei/ Prof. Kennedy Okeyo	**Track 1.2 Antimicrobial stewardship in low resource settings** Title 1: Evidence strategies for antimicrobial stewardship: what works and doesn't work Title 2: The Antimicrobial Stewardship Team Room: SarJ - Room 2 Instructor: Prof. Dr. Elaine Larson/ Prof. Lisa Saiman
	12:45 – 13:50	Lunch break	

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	14:00 – 16:00	**Track 1.1 Diagnostic stewardship in low resource settings** Title. Evaluation of diagnostic systems under limited logistical conditions Room: SarJ - Room 1 Instructor: Prof. Matilu Mwau/ Dr. Eddy Odari	**Track 1.2 Antimicrobial stewardship in low resource settings** Title 1: Surveillance to demonstrate effectiveness of antimicrobial stewardship (group discussion) Title 2: Direction forward (Group discussion 2) Room: SarJ - Room 2 Instructor: Prof. Dr. Elaine Larson/ Prof. Lisa Saiman/ Dr. Serah Kaggia/ Dr. Celestine Makobe
	16:00 – 16:30	Coffee break	
	16.30 - 17.00	Practical sessions	

Thursday, 9 August 2018

Thursday, 9 August 2018	09:00 – 10:30	**Track 1.1 Diagnostic stewardship in low resource settings** Title. Use of Bioinformatic tools in diagnostic stewardship Room: SarJ - Room 1 Instructor: Prof. Achut Sapkota/ Dr. Steven Ger Nyanjom	**Track 1.2 Antimicrobial stewardship in low resource settings (infection control)** Title 1: Introductions: Poll audience for current resources/ activities/ patient populations served/ priorities Title 2: Hand Hygiene (HH): How are we doing and how we can improve? Room: SarJ - Room 2 Instructor: Prof. Dr. Elaine Larson/ Prof. Lisa Saiman/ Tiberi Nyakwana
	10 :30 – 11:00	Coffee break	
	11 :00 – 12:45	**Track 1.1 Diagnostic stewardship in low resource settings** Title. Use of Bioinformatic tools in diagnostic stewardship (Practical session) Room: SarJ - Room 1 Instructor: Prof. Achut Sapkota/ Dr. Steven Ger Nyanjom/ Mr. Josiah Kuja	**Track 1.2 Antimicrobial stewardship in low resource settings** Title 1: Device-related infections: process and outcome measures using evidence-based bundles and monitoring central line associated bloodstream infections (CLABSIs) and catheter-associated urinary tract infections (CAUTIs) Title 2: Surgical site infections: Challenges of implementing bundles and outcomes: Winning the hearts and minds of the interdisciplinary perioperative care teams Room: SarJ - Room 2 Instructor: Prof. Dr. Elaine Larson/ Prof. Lisa Saiman/ Dr.

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			Serah Kaggia/ Dr. Celestine Makobe
	12:45 – 13:50	Lunch break	
	14:00 – 16:00	**Track 1.1 Diagnostic stewardship in low resource settings** Title: Minimization of experimental samples using bioinformatics approach/ identification of biomarkers - practical session) - instructions carry laptops Room: SarJ - Computer lab Instructor: Prof. Achut Sapkota/ Dr. Steven Ger Nyanjom/ Mr. Josiah Kuja	**Track 1.2 Antimicrobial stewardship in low resource settings** Title 1: Surveillance strategies for healthcare-associated infections (HAIs (Group discussions) Title 2: Direction forward (Group discussions) Room: SarJ - Room 2 Instructor: Prof. Dr. Elaine Larson/ Prof. Lisa Saiman/ Tiberi Nyakwana
	15:00 – 15:30	Coffee break	
	15:30 – 17:30	**(EMPTY SLOT)**	

Friday, 10 August 2018

Friday, 10 August 2018	09:00 – 10:30	**Track 1.3 Common topics** (Track 1.2 and 1.3) Title: How novel diagnostics can help in clinical decision making for antibiotic prescribing Room: SarJ Hall Instructor: Prof. Lutz Guertler
	10:30 – 11:00	Coffee break
	11 :00 – 12:45	**Track 1.3 Common topics** (Track 1.2 and 1.3) Title. Diagnostic pathway and good clinical practice (Case study of patient management at Agakhan University Hospital, Nairobi) Room: SarJ Hall Instructor: Prof. Gunturu Revathi
	12:30 – 13:30	Lunch break
	14.00: – 15:00	All Tracks: Evaluation of week 1
	15:00 – 18:00	Break (groups free to work)
	18:00	End of first week reception

Topic 2 - Climate change, mathematical modelling of infectious diseases and use of climate information in health decision-making

Monday, 6 August 2018

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Monday, 6 August 2018	**08:30 – 09:00**	Registration	
	09:00 – 10:30	Opening session	
	10:30 – 11:00	Coffee break	
	11:00 – 11:30	**Track 2.0 Common topic on climate health (2.1 and 2.2)** Title. Introduction to Climate Information for Public Health Decision Making Room: AICAD hall (TBC) Instructor: Prof. Dr. Madeleine Thomson	
	11:30 – 12:45	**Track 2.1 Operational side of climate health** Title: Introduction Room: AICAD (comp lab) Instructor: Dr. Madeleine Thomson	**Track 2.2 Mathematical modelling of diseases** Title: Introduction to R language Room: AICAD (comp lab) Instructor: Ms Ana Menezes
	12:45 – 13:50	Lunch break	
	14:00 – 16:00	**Track 2.1 Operational side of climate health** Title: Data, Methodologies and Tools: ENACTS and Maprooms Room: AICAD Instructor: Dr. Gikungu and Mr Paulino Omay	**Track 2.2 Mathematical modelling of diseases** Title: Introduction to R language Room: Instructor: Dr. Felipe Cólon
	16:00 – 16:30	Coffee break	
	16:30 – 17:00	Rick up sessions (optional)	

Tuesday, 7 August 2018

Tuesday, 7 August 2018	09:00 – 10:30	**Track 2.1 Operational side of climate health** Title: Presentation on the importance of seasonality in infectious diseases surveillance, disasters and nutrition. Room: Instructor: Dr. Madeleine Thomson, Dr. Gikungu and Mr Paulino Omay	**Track 2.2 Mathematical modelling of diseases** Title: Introduction to infectious disease modelling Room: Instructor: Dr. Nakul Chitnis
	10:30 – 11:00	Coffee break	

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	11:00 – 12:45	**Track 2.1 Operational side of climate health** Title: Presentation on the use of climate information in health impact assessment. Room: Instructor: Dr. Madeleine Thomson, Dr. Gikungu and Mr Paulino Omay	**Track 2.2 Mathematical modelling of diseases** Title: Deterministic compartmental models Room: Instructor: Dr. Nakul Chitnis
	12:40 – 13:50	Lunch break	
	14:00 – 16:00	**Track 2.1 Operational side of climate health** Title: Identifying new opportunities for using Maproom information in infectious disease decision-making. Room: Instructor:	**Track 2.2 Mathematical modelling of diseases** Title: Modelling heterogeneity seasonality and stochasticity Room: Instructor:Dr. Nakul Chitnis
	16:00 – 16:30	Coffee break	
	16:30 – 17:00	Rick Up (optional)	

Wednesday, 8 August 2018

Wednesday, 8 August 2018	09:00 – 10:30	**Track 2.1 Operational side of climate health** Title. Introduction to climate drivers including the El Nino Southern Oscillation and the Indian Dipole Room: Instructor: Dr. Angel Munoz and Dr. Madeleine Thomson	**Track 2.2 Mathematical modelling of diseases** Title: Application to malaria modelling Room: Instructor: Dr. Nakul Chitnis
	10 :30 – 11:00	Coffee break	
	11 :00 – 12:45	**Track 2.1 Operational side of climate health** Title: Exercise ENSO Maprooms Room: Instructor: Dr. Angel Munoz, Mr Paulino Omay and Dr. David Gikungu	**Track 2.2 Mathematical modelling of diseases** Title: Application to malaria modelling Room: Instructor: Dr. Nakul Chitnis
	12:45 – 13:50	Lunch break	
	14:00 – 16:00	**Track 2.0 Common topic on climate health (2.1 and 2.2)** Title: Presentation on how are seasonal forecasts made and communicated	

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		Room: Instructor:
	16:00 – 16:30	Coffee break
	16.30 - 17.00	Practical sessions

Thursday, 9 August 2018

Thursday, 9 August 2018	09:00 – 10:30	**Track 2.1 Operational side of climate health** Title: Presentation – climate varies on multiple timescales: seasonal, decadal and climate change Room: Instructor: Dr. Angel Munoz	**Track 2.2 Mathematical modelling of diseases** Title: Working with climate information Room: Instructor: Dr. Felipe Cólon
	10 :30 – 11:00	Coffee break	
	11 :00 – 12:45	**Track 2.0 Common topics (2.1 and 2.2)** Title: Exercise: Time Scale decomposition Room: Instructor: Dr. Angel Munoz	
	12:45 – 13:50	Lunch break	
	14:00 – 16:00	**Track 2.0 Common topic for climate health (2.1 and 2.2) (*participants encouraged to carry data)*** Title: Individual work using data and tools made available with focus on specific problem, season and region Room: Instructor:	
	15:00 – 15:30	Coffee break	
	15:30 – 17:30	**Track 2.0 Common topic for climate health (2.1 and 2.2)** Title: Report back to group and group discussion. Room: Instructor:	

Friday, 10 August 2018

Friday, 10 August 2018	09:00 – 10:30	**Track 2.0 Common topic for climate health (2.1 and 2.2)** Title: Group work (poster development) Room: Instructor:
	10:30 – 11:00	Coffee break
	11 :00 – 12:45	**Track 2.0 Common topic for climate health (2.1 and 2.2)** Title: Group work (poster development) Room: Instructor:

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	12:30 – 13:30	Lunch break
	14.00: – 15:00	All Tracks: Evaluation of week 1
	15:00 – 18:00	Break (groups free to work)
	18:00	End of first week reception

WEEK 2: IMPLEMENTATION RESEARCH (FROM EVIDENCE TO POLICY AND PROGRAMS

Monday, 13 August 2018

Monday, 13 August 2018	09:00 – 10:30	**Track 3** Title: Introduction to implementation research and multi-sectoral involvement into Implementation research. Room: SarJ Instructor. Prof. Elizabeth Bukusi
	10 :30 – 11:00	Coffee break
	11 :00 – 12:30	**Track 3** Quality improvement as a management tool Room: SarJ Instructor. **John Wanyugu**
	12:30 – 14:30	Lunch break
	14:30 – 16:30	**Track 3** Dissemination research and social marketing
	16:30 - 16:45	Coffee break
	16:45 - 17:30	Group Work

Tuesday, 14 August 2018

Tuesday, 14 August 2018	09:00 – 10:45	**Track 3** Policy development, stakeholder and policy analysis Room: SarJ Instructor. **Dr Isabela Maina**
	10 :45 – 11:00	Coffee break
	11 :00 – 13:00	**Track 3** From research to policy: examples from Kenya Room: SarJ Instructor. **Prof. Ruth Nduati**
	13:00 – 14:30	Lunch break
	14:30 – 16:30	**Track 3** Surveillance to Measure Impact & Inform Strategies Room: SarJ Instructor. Dr. Odhiambo

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	16:30 - 16:45	Coffee
	16:45 – 17:30	**Group Work**

Wednesday, 15 August 2018

Wednesday, 15 August 2018	09:00 – 10:45	**Track 3** Economic Analysis & Cost Effectiveness Analysis Room: SarJ Instructor. Dr. Riro Matiko
	10 :45 – 11:00	Coffee break
	11 :00 – 12:30	**Track 3** Metrics & Measuring Effectiveness and Impact Room: SarJ Instructor. Dr. Njoroge
	12:30 – 14:00	Lunch break
	14:00 – 17:30	**Group Presentations**

Symposium (16-17 August 2018)

Thursday, 16 August 2018

Thursday, 16 August 2018	08:45 - 09:30	Welcome Opening Symposium - Vice Chancellor JKUAT/ representative from the Ministry of Education)
	09:40 – 10:55	- WHO/JEE health security assessments of and upscaling epidemic preparedness for Eastern and Southern Africa. **Speaker:** Prof. Wilmot James **Panelists:**
	10 :55 – 11:15	Coffee break
	11 :15 – 12:30	- Global Health Security Agenda and Children **Speaker:** Prof. Larry Stanberry **Panelists:** Dr. Philip Larussa
	12 :30 – 14:00	Lunch break - Posters presentation
	14:00 – 15:45	Climate information and health system **Speaker:** Prof. Madeleine Thomson **Panelists:**
	15:45 – 16:15	Climate information and health system (Discussions and way forward) **Speaker:** Prof. Madeleine Thomson **Panelists:**
	16:15 – 16:45	Coffee break
	16:30 – 17:20	A brief tour of Sarjorec botanical garden
	18:00	**Departure for Networking Dinner**

Friday, 17 August 2018

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Friday, 17 August 2018	09:00 - 09:30	Welcome
	09:30 – 10:15 10:15 - 11:00	**Session Chair: Prof. Dr. h.c Lutz Guertler (TBR)** Framework, funding and governance on multi-disciplinary disciplinary antimicrobial stewardship **Speaker**: Prof. Dr. Kevin Marsh (Director Africa Academy of Sciences) Establishing strong multi-disciplinary - multi-sectoral collaborations (Experiences and lessons learnt) **Speaker**: Prof. Dr. Elizabeth Bukusi (Kenya Medical Research Institute)
	11 :00 – 11:20	Coffee break
	11 :20 – 13:00	**Session Chair:** Prof. Dr. Matilu Mwau Linking Academia and Industry in Research and Innovation (Practical lessons) **Speaker**: Prof. Mary Abukutsa (Deputy Vice Chancellor (Research, Production and Extension)- JKUAT) Ideal partnerships as opportunities to young researchers (where we are and where we ought to be...Experiences from Japan) **Speaker**: Prof. Kennedy Okeyo (Kyoto University - Japan)
	13 :00 – 14:30	Lunch break
	14:30 – 15:30	**Poster Presentations**
	15:30 – 16:30	Closing Ceremony - Director (National research Fund) - DVC AA Vice Chancellor (JKUAT)

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