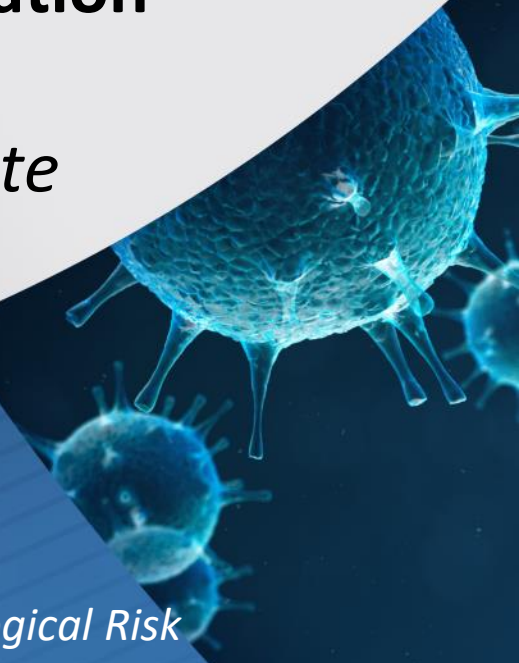




Initial (Undergraduate) training/education on Biosafety and Biosecurity *- Establishment of a new Undergraduate Degree Program*

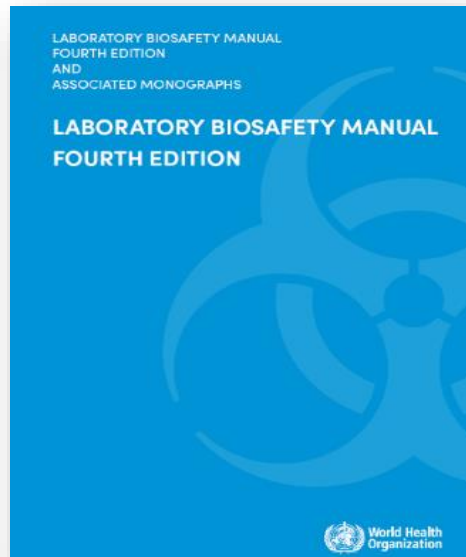
*Fidelis Mambo
CoD, Medical Laboratory Sciences-MMUST, Kakamega City.
IFBA Certified Professional in Biorisk Management and Biological Risk
Assessment*





Biosafety & Biosecurity Professionals

- A knowledgeable and capable biosafety officer, whether a full-time employee or part-time responsibility, is a foundational element for a laboratory's biosafety and biosecurity program
- Should have the necessary expertise to advise all personnel and management on biosafety/biosecurity issues and concerns



"The process of controlling and improving the safety of the laboratory needs good coordination. For this a Biosafety Officer must be appointed."

[WHO Laboratory Quality Stepwise Implementation Tool, 2015](#)



Biosafety & Biosecurity Professionals

- COVID-19 pandemic placed a significant demand on the biosafety and biosecurity profession & shortage of these specialized individuals in many countries

“The Zika virus epidemic and the COVID-19 pandemic have demonstrated the critical need for consistent and sustainable funding of biosafety expertise in public health laboratories to support the emergency response to emerging infectious diseases.”

[Biosafety Professionals: A Role in the Pandemic Response Team](#), Health Security, Vol. 19, 2021

“There was a consistent multivariate trend that involvement in various pandemic tasks was associated with more workload. Biosafety expertise is needed but asking them to do too much is likely unsustainable.”

[Experiences During COVID-19: A Survey of Biosafety Professionals](#), Applied Biosafety, Vol. 27, 2022



Biosafety & Biosecurity Professionals

- It remains one of the “*weakest core capacities*” of WHO Member States identified by IHR monitoring and evaluation activities
- In Africa, “*limited expertise in biosafety and biosecurity*” is a key gap requiring urgent attention

World Health Organization Health Topics Countries Newsroom Emergencies Data About WHO

Safeguarding biosafety and biosecurity in laboratories

Overview

Member States to develop capacities to identify, store and securely handle dangerous biological agents and toxins according to international best practices.

Although biosafety & biosecurity awareness and expertise has improved greatly in the past few decades through the availability more effective safety equipment and automated diagnostic technologies it remains one of the weakest core capacities of Member States identified by IHR monitoring and evaluation activities.

WHO helps Member States build their national biosafety and biosecurity capacity through guidance documents, tools, technical assistance, and resource mobilization. This includes supporting trainings on biological risk management, sharing best practices through workshops and meetings; providing regulatory frameworks; and ensuring biological agents are transported safely.

African Union AFRICA CDC

The Africa Centres for Disease Control and Prevention

Biosafety and Biosecurity Initiative

2021 - 2025 Strategic Plan



Biosafety & Biosecurity Professionals

- Kenyan Labor Minister has recently decried a shortage of qualified safety inspectors to ensure workplaces, including those handling biological materials, are safe and secure
- President's Ruto's speech to graduates at MMUST stressed the need for universities and government to work together focusing on extracting lessons from the pandemic

14 NEWS BEAT PEOPLE

Labour minister pitches for safer work places

by Reuben Mwambingu
@reubenmwambingu

Labour Cabinet Secretary Florence Bore (*right*) has decried a shortage of health and safety inspectors at most workplaces and informal settlements. Addressing the press at a Mombasa hotel, Bore said there were less than 140 inspectors, adding that there was a deficit of 250 inspectors.

She said the situation is undermining the government's efforts to ensure that every workplace is free of hazards and "complies with the Work, Health and Safety Regulations. Safety inspectors have wide-ranging powers to help them fulfill their functions through the Directorate of Occupational Safety and Health Services," said Bore.

According to the CS, the Directorate has a duty to ensure that every workplace is free of hazards. "Its services include, but are not limited to, registration of workplaces, registration of plants, registration of approved persons and institutions, workplace inspection and audits, examination and testing of plants, accident investigation and Work Injury Benefits Act process-

ing," she said, adding that the government should employ 250 more inspectors. She urged employers to comply with health and safety standards.

The Directorate's secretary, Dr Musa Nyandusi, said growth of the unregulated, informal sector has equally made it difficult to enforce the Work Health and Safety Regulations, adding that 86 per cent of workplaces in Kenya are informal and unregulated.

"For example, a person employed in a small café to chop vegetables; it is difficult to inspect whether they are working in a safe environment", he said.






Biosafety & Biosecurity Professionals

- Biosafety professionals tend to learn on-the-job or through training workshops, not through formal education in higher learning institutions
- No clear road-map for a young person wishing to enter the field of biosafety & biosecurity

"There is no clear career road map for a young scientist wishing to enter the biosecurity diplomacy field. There are few educational programs focused on biosecurity, and most are costly graduate programs located in the United States."

[The Next Wave of Biosecurity Experts: Young Scientists Need a Better Path into Global Diplomacy](#), Science and Diplomacy, 2022.



Biosafety Professional??

Biosecurity Professional??



Solving the Issue – locally and beyond

- Solving the issue requires a sustainable approach
- In addition to training, there is a need to “formalize” the biosafety profession as a career path with a **focus on post-secondary education**
- Now is right time as youth are motivated to get involved

“A sustainability strategy must also consider sustainable approaches to education, training and retention of competencies. Improvements will require ongoing investments and innovation in training techniques, with a focus not only on training, but on secondary and post-secondary education and continuing education. Gains are likely to be incremental in nature.”

[OIE Consultation on Sustainable Laboratories](#), 2018



Training versus Education

- **Training** builds selected technical competencies amongst **professionals that are already working in the field**. These professionals apply what they may have learned in training to their regular work in biosafety and biosecurity.
- **Training is job-oriented**
 - Training is different than Professional Certification, where professionals **demonstrate** professional competency.
- **Education** builds a technical foundation of knowledge and understanding **for students before they enter the workforce**. This is often referred to as building **‘pre-service’** technical competency.
 - **Education is career-oriented**





BSc Undergraduate Degree Biosafety & Biosecurity

- IFBA is collaborating with Masinde Muliro University of Science & Technology in Kakamega, Kenya
- Develop and pilot new undergraduate degree program specifically in biosafety & biosecurity

www.internationalbiosafety.org

INTERNATIONAL FEDERATION OF BIOSAFETY ASSOCIATIONS

Undergraduate BSc. Degree in Biosafety & Biosecurity

Masinde Muliro University of Science & Technology | Kakamega, Kenya

www.mmust.ac.ke

Lead the way with a degree in Biosafety and Biosecurity from MMUST

Biosafety and biosecurity professionals provide an essential role in safeguarding infectious disease agents in clinical and research laboratories and other settings where biological materials are handled. Masinde Muliro University of Science and Technology (MMUST) is developing a new undergraduate BSc. program in Biosafety & Biosecurity in collaboration with the International Federation of Biosafety Associations and with technical expertise from the University of British Columbia's Department of Safety & Risk Services. For the past 10 years, MMUST's Department of Medical Laboratory Sciences has been actively educating students through their BSc. in Medical Biotechnology and BSc. in Medical Laboratory Sciences. MMUST is now preparing the curriculum for a new undergraduate BSc. degree program in Biosafety and Biosecurity which models and leverages these existing programs. All students undertake related core courses in the first two years of study, followed by specialized courses in biosafety and biosecurity with practical laboratory experience in their later academic years. The experiences and lessons learned at MMUST will be shared with the international biosafety and biosecurity community for further implementation in universities globally.

International Federation of Biosafety Associations

THE UNIVERSITY OF BRITISH COLUMBIA

in partnership with Canada





BSc Undergraduate Degree Biosafety & Biosecurity

- Academic, private industry, civil society and government partners
 - Technical University of Kenya, University of Health & Allied Sciences,
 - University of British Columbia
 - Germfree Inc, NuAire, Pandemic Tech
- Funding is provided by Global Affairs Canada under the “*Signature Initiative to mitigate biological threats in Africa*”



Technical University of Kenya



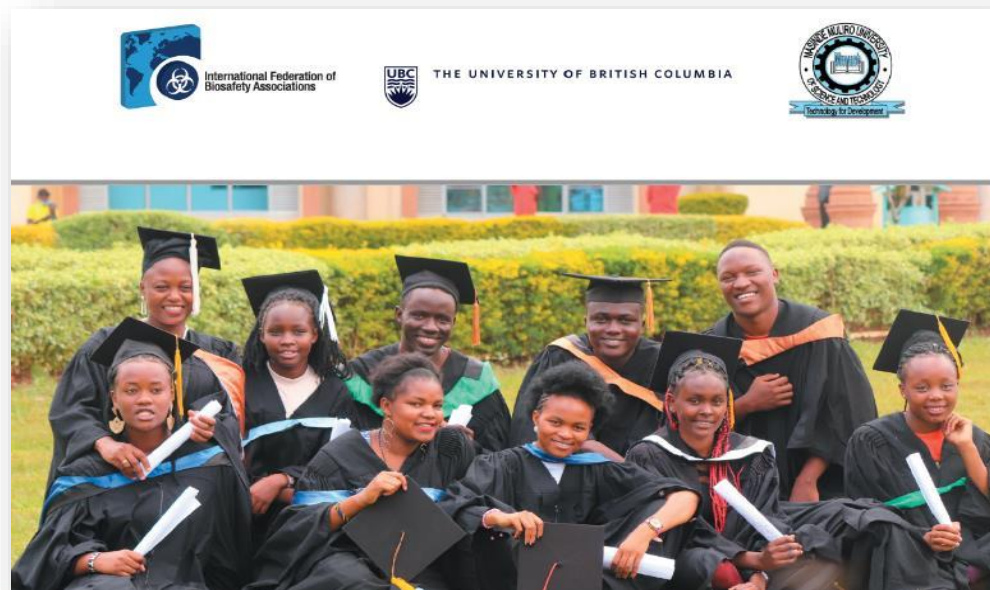
THE UNIVERSITY OF BRITISH COLUMBIA





BSc Undergraduate Degree Biosafety & Biosecurity

- Build upon existing MMUST unit course in biosafety/biosecurity, & Medical Laboratory Sciences & Medical Biotechnology programs
- All students undertake related core courses in first two years followed by specialized biosafety/biosecurity courses, practical laboratory & field experience, and capstone project in later academic years

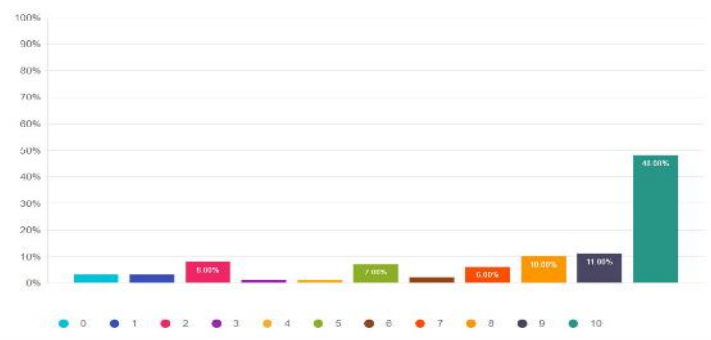




BSc Undergraduate Degree Biosafety & Biosecurity

- Needs assessment survey has been completed to gather input on needs and design of the program
- Received input from stakeholders across East Africa

9. How would you rate the need for BSc. in Biosafety & Biosecurity? (on a scale from 1-10)
Why did you give it that rating?

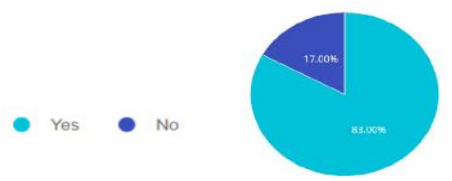


MMUST BSc. Biosafety and Biosecurity - Needs Assessment Questionnaire

18. With respect to curriculum, please rate the importance of the following biosafety & biosecurity skills and competencies. (on a scale from 1-5)



10. In the next 10 years, do you expect your organization will benefit from the program's graduates?





Government Stakeholder Consultations

- Ongoing engagement with Kenyan government and other key stakeholders
 - Ministry of Health (DG Health, Global Health Security, Director Diagnostic Services Division, Head NPHL)
 - Ministry of Labor (Director DOSH)
 - OIE Regional Representative
- Placement of students during their field attachments and after graduation for employment



Dr. Jean Gitau · 3rd+

Global Health Security Officer at Ministry of Health, Government of Kenya

1d · 🌐

Today we held fruitful discussions with the International Federation of Biosafety Association as they embark on rolling out the BSc. Degree in Biosafety and Biosecurity at Masinde Muliro University. The scientists trained in this degree will go a long way in enhancing our country's biosafety-biosecurity capacities in areas where enhanced health security is needed eg our laboratories.

[#health](#) [#security](#) [#university](#) [#ghs](#)





Internal MMUST Consultations

- Internal meetings at MMUST with Vice-Chancellor, Deputy-Vice Chancellor, Dean School Public Health
- 2 workshops held to finalize 4-year course curriculum
 - Alignment with MMUST Curriculum Development Directorate, Quality Assurance Directorate and Kenyan Commission for University Education Requirements
 - Participation of MMUST staff, Kenyan/Tanzanian biosafety specialists, University of British Columbia

MMUST DEVELOPS PIONEER COURSE IN BIOSAFETY AND BIOSECURITY

Masinde Muliro University of Science and Technology (MMUST) is developing a new undergraduate program 'Bachelor of Science in Biosafety and Biosecurity,' the only one of its kind in Kenya and beyond. This is in collaboration with the [International Federation of Biosafety Associations \(IFBA\)](#) and technical expertise from the [University of British Columbia's](#) Department of Safety and Risk Service. The move towards the pioneer course in Biosafety and Biosecurity was discussed extensively at the two-day Curriculum Review Workshop organized by MMUST's [Medical Laboratory Sciences \(MLS\) Department](#) on 2nd and 3rd June 2022, at [Golf Hotel, Kakamega](#).

MLS is a department domiciled in the [School of Public Health, Biomedical Sciences & Technology \(SPHBST\)](#) led by the Dean, [Prof. Edwin Wamukoya](#) and Chairman of Department (CoD) [Mr. Fidelis Mambo](#), The department has been training and mentoring students in Diploma in Medical Biotechnology, Bachelor of Science in Medical Biotechnology as well as Bachelor of Science in Medical Laboratory Sciences, plus a number of Postgraduate courses in Biomedical Sciences and Medical Laboratory Sciences.

PARTNERS FROM CANADA PAY COURTESY CALL TO MMUST'S VICE CHANCELLOR
Good morning Mmustians!





4 Year Course Curriculum

- 4-year course curriculum finalized and approved by MMUST Senate
 - Submitted to Kenyan Commission for University Education (regulatory authority) & will be listed in Kenya University & College Central Placement Services
- In addition to courses related to microbiology, virology, biotechnology and other fundamental aspects of the degree program, the curriculum includes 25 biosecurity specific courses such as:
 - Biorisk Management Roles & Responsibilities, Policies & Legal Frameworks
 - One Health, Biological Non-Proliferation & Biodefense, DURC & Bioscience Risks, Advances in Life Sciences, Cyberbiosecurity
 - Biological Risk Assessment & Mitigation, Biocontainment Facility Design, Biosafety Cabinets & Primary Containment Equipment
 - Program Management & SOP Development, Audits & Inspections, Leadership & Design Thinking
 - Field Outbreak Response, Crisis & Risk Communication, Incident Management & Emergency Response, Pandemic Preparedness & Response



Sustainable Laboratories

- Education on sustainable laboratory design, operations and maintenance is included within the curriculum
 - Experts from IFBA, Germfree, NuAire, AFMS and other partners participating in course development & delivery of courses on these issues

Project Name: Infectious Disease Diagnostic Laboratory: Natural Ventilation/Sustainable Systems

Initiative Sponsor: BEWG: Biosafety Engineering Working Group under the auspices of the IFBA- International Federation of Biosafety Associations

Location: Africa (or warm climate geography)

Value \$: 4-5 Million CDNs (estimate)

Size of Project: Approximately 150 m².

Preliminary Design Work Underway: 2013

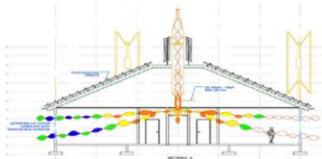
Firm Leading the Assignment: Merrick Canada

Contact Reference: Paul Langevin/Xavier Munoz

Phone Number: (1-613-410-8993)



Merrick & Company, under direction and support of the BEWG and IFBA, has developed a preliminary design for consideration that uses natural supply ventilation and hybrid mechanical exhaust ventilation to provide air-conditioning and directional airflow in support of an infectious disease diagnostic laboratory. The principles of thermal buoyancy and wind are maximized to provide a sustainable solution. Additionally solar and wind power provide electrical support for primary and/or back-up energy linked to local utility companies and emergency generators if necessary. Air quality is controlled by a combination of convective entrainment baffles and filtration. A central up-lift, two stage fan is also provided to simplify the directional airflow. The architecture of the laboratory has three separate diagnostic zones with a specimen receiving, a small pathogen storage zone and inoculation rooms supporting each lab zone



The shape of the facility uses millennium-old concepts that has been used for natural ventilated structures and has enhanced the controllability to include a n-mechanical fan to be tasked when thermal loads require or natural effects need augmentation. A water capture and storage system is also contemplated to include pre-treatment for internal use and integration with a utility supply. The design basis that has been applied considers various forms of sustainable opportunities, further considerations include light harvesting, re-circulation for the clean exhaust air, electrical task-based heat and plenum return air.

Activities executed provided can be characterized as:

- Use of conventional and molecular PCR techniques to conduct preliminary and confirmatory diagnosis of BSL-2 or BSL-3 infectious agents.
- Reporting results to a central national laboratory.
- Providing regional diagnostic support for a countries disease response network
- Sample accessioning and processing throughout the 3 zones/lab
- Biological Safety Cabinet placement for air pattern wind protections
- Pathogen storage for regional considerations



Modular Sustainable Laboratories for Health Security

Laboratories are an integral component of health security and play a major role in the safe and secure handling of biological materials. Building new laboratory infrastructure that is highly dependent on engineering controls and technology presents a challenge in many countries where construction and maintenance costs are prohibitive. Rather than taking a high technology approach, the IFBA adopts a risk-based approach to designing "built-to-purpose" laboratory equipment and infrastructure that is:

- relevant to local circumstances
- tailored to the actual risks of an individual laboratory
- economically feasible and cost-effective to maintain

Modular pre-manufactured laboratories have proven to be a successful and sustainable approach to meet public and animal health diagnostic, surveillance and research laboratory needs across the African continent. Conforming to the latest WHO guidelines, [AFMS's modular diagnostic labs](#) are provided with primary and secondary containment equipment based on a local risk assessment and engineered to be energy efficient, durable and most importantly, locally maintained over the long term. www.afms.biz



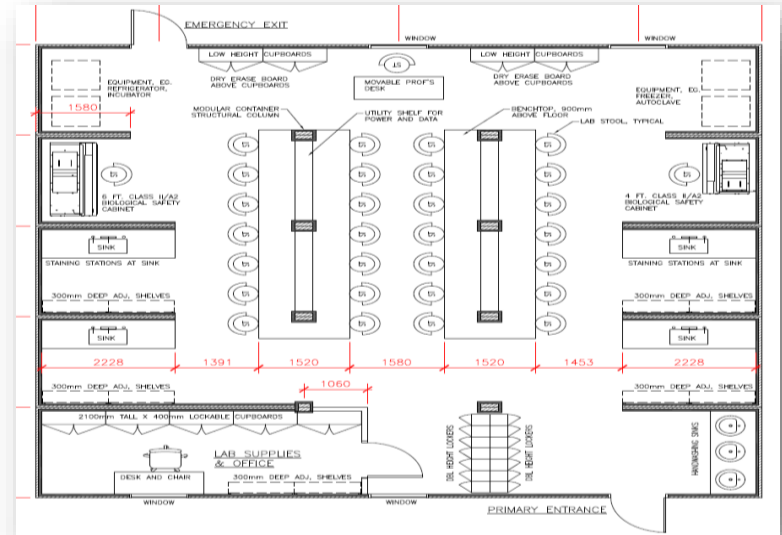
Click [here](#) to read more about the AFMS modular laboratory in Nigeria, designed to ensure effective management of infectious disease outbreaks with a special focus on containing and strengthening Lagos state's capacity to prevent, detect and respond to all biological threats.

Click [here](#) to watch the IFBA's video on sustainable laboratories.



K2B2 Education Lab

- Concept paper underway by IFBA and MMUST to develop a *Kizazi Kipya Biosafety Biosecurity (K2B2)* education laboratory on-site at MMUST campus in Kakamega
- Modular laboratory using sustainable design approaches
 - Team of architects, engineers, biosafety professionals with expertise in this area completed initial conceptual design





Ongoing Student Outreach

- MMUST and the IFBA's East Africa Program Coordinator based in Kenya, are continuing their active outreach for future graduate placements in the workforce and for engagement of the first cohort of students





A Call to Action

- Development of a BSc. undergraduate program in biosafety and biosecurity is an important step forward to solving the overall shortage of these professionals
- Long-term multi-sectoral, collaborative approach to building capacity through education to create the biosafety and biosecurity professionals of the future with knowledge and expertise in sustainable biosafety & biosecurity approaches





Thank You