THE WITS PhD Seminar

The Postgraduate Affairs Office is proud to announce the Wits PhD Seminar, an annual cross-faculty competition for innovative Wits PhD students who are at least two years into their research.

2020 COMPETITION TOPIC: PANDEMIC

29 September 2020: Session 1

09:45

1 Albert Whata: Change Point Detection for SARS-CoV-2 DNA Sequences

School: Statistics and Actuarial Studies

COVID-19, the disease caused by SARS-CoV-2, has spread to more than 213 countries, and has since been declared a global pandemic by the World Health Organization. Scientists are yet to come up with a vaccine to control the spread of the virus. Viral outbreaks demand early understanding of the evolution of the virus's genomic sequence for strategic planning, containment, and treatment. This research uses SARS-CoV-2 genomic signatures together with deep learning methods to identify change points in the virus genomes. We propose a deep learning algorithm that uses recurrent neural networks (RNN), to automatically detect change points in the properties of the SARS-CoV-2 DNA sequence, i.e., chromosomal regions with "abnormal" mean levels. A Change point in a sequence is a "rare" event and makes it harder for the classification problem to detect it, as the dataset will be heavily imbalanced. Detection of these regions is extremely significant for understanding the evolutionary processes of the SARS-CoV-2 DNA sequence. The number and location of the change points can assist scientists or pharmaceutical companies who are making every effort to develop COVID-19 vaccines to make appropriate decisions.

10:10

2 Anza Thiba: Hypertension: A Global Pandemic

School: Clinical Medicine

About 25% of the global adult population is affected by hypertension. It has become a major contribution to the global burden of diseases, costing billions of dollars for

treatment and a great expense to the health care system. Hypertension is a major risk factor for cardiovascular diseases, stroke and end-stage organ failure. If it goes untreated, it leads to mortality. This far, the cause of essential hypertension remains unknown. There has been an increasing realization that gut microbiota plays an important role in pathogenesis of various cardiovascular and metabolic disease and might have a role in the development of hypertension. Studies have associated an altered gut microbiome with hypertension. This study aims to investigate the role played by gut bacteria in the development of hypertension. We hypothesize that gut microbiota are involved in the synthesis of secondary metabolites of cholesterol. These metabolites can influence constriction and vasodilation of smooth muscles in arteries and veins therefore affecting blood pressure. Understanding the underlying mechanisms that lead to the development of hypertension will improve understanding of the disease and may contribute to the development of better and efficient diagnosis, treatments, management and prevention of this disease.

10:35

3 Carol Preston: Responding to multiple pandemics through arts-based activities with primary school children in a rural community

Wits School of Arts; Drama for Life

Prior to Covid-19 the world has suffered other pandemics which include the long lasting, colonially-instituted pandemic of greed that caused, and perpetuates, environmental degradation, and what I refer to as the plastic tsunami pandemic of the last sixty years.

The destructive effects of these two pandemics underpin a doctoral research project, which has aimed to use arts-based activities to improve the environmental behaviour of a group of children in a rural community.

Using the work of Heleta, Jenson and Von Wong, I aim to show that the work of the academy needs to be more visible to the public so that knowledge can be disseminated to people of action. I will argue too, that hope needs to be discarded at this time because hope implies passivity. Finally, I will argue that applied arts, if used to curb the effects of the pandemics mentioned above, together with the current Covid-19 pandemic, need to have depth of substance rather than the breadth of replication evident in social media. I will use findings from the cycles of action research already undertaken with the children to support my argument and outline plans for the completion of the project in these uncertain times.

11:00

4 Caroline Rimmer: *Anxiety: The unseen killer*

Wits School of Education

My research focuses on how motivation may affect the disconnect between learned and applied spelling in written work with young boys. What is emerging from the data is how anxiety influences how the boys learn, conserve, and apply the words to their writing. I will argue that a pandemic caused by the anxiety virus, can be just as devastating to the global, inner world of young students as a biological agent can be to a population of people. It starts with an infection, spreads along the neurological pathways in the brain that are linked academically and emotionally and ends in a pandemic where the virus affects all aspects of that inner world. The symptoms of infection are difficult to diagnose, as they exist co-morbidly with other symptoms. The cure is complex as the virus could combine with other viruses, such as demotivation, to mutate and spread the dis-ease. Vaccines are available, but they are not always effective. There are preventative measures that can be taken, but these are, sadly, optional. The frontline workers are the children, and the effort required to perform is exhausting. This pandemic is insidious. It kills self-esteem. It kills self-belief. It kills productivity. It kills motivation.

11:25

5 Chia-yu Chen: Transgenic crops: The missing link in the battle against pandemics

School: School of Molecular and Cell Biology

Between the first recorded pandemic in 430 BC, which was theorised to be smallpox or typhoid, and the most recent COVID-19 pandemic, countless others have existed. One of the major socio-economic crises that arise from pandemics is the food security crisis and disturbance of the agricultural sector which is already facing pressures associated with the expanding human population. Since the common aspect that pandemics share is the rapid spread through contact with the pathogen, strategies to combat agricultural challenges should also move towards maximising social distancing. Current transgenic crops are mainly insect resistant or herbicide tolerant which already eliminate the need for in-person applications of pesticides and herbicides. Furthermore, transgenic crops can be engineered to express improved nutritional content which has helped to solve malnutrition in developing countries. Biopharming is another avenue for transgenic crops where pharmaceuticals such as vaccines are expressed by plants. The capabilities and benefits of transgenic crops are endless. Thus, the ability of current transgenic crops to maximise social distancing during pandemics will be discussed. Additionally, a novel approach to the use of transgenic crops for the mass expression of pharmaceuticals for use in the current COVID-19 pandemic and future pandemics will be explored.

11:50

6 Claire Hart: The sibling pandemic: What psychoanalytic sibling research can teach us about the COVID-19 world

School of Human and Community Development

The collective human experience of the COVID-19 pandemic has destroyed our way of being in the world, heralding a new era of mask wearing, social distancing, and online relating. I am particularly interested in exploring how COVID-19 has revealed something fundamental about what happens to us as humans when our world is suddenly destroyed by a threatening external force. This external threat seems to be here to stay, even though we may attempt to minimize or deny this reality. Drawing upon my psychoanalytic research on siblings, I will explore how the emotional responses evoked by the arrival of a sibling in childhood mirror what many of us initially experienced in response to COVID-19, including feeling like our omnipotence was under attack, the experience of overwhelming anxiety, the fear of annihilation, and rivalry for available resources. Similar to how the arrival of a sibling represents a relational and existential loss as the child loses its known place in the family and world, COVID-19 has impacted on the fabric that holds our societies, families and psyches together. I propose that psychoanalytic sibling research may offer us insight into how to weave together new societal, family and psychic structures in the COVID-19 world.

12:15 hr

7 Jorge da Rocha: Parallel Pandemics - Pharmacogenomics and Prevaricators*

School of Pathology

The world is desperate for easy solutions to the COVID-19 pandemic and our leaders default to one-size-fits-all strategies and treatments, no matter if these have little scientific basis, or are outright fallacies. My PhD research uses genomic knowledge to show that genetic diversity is relevant to therapeutic approaches for COVID-19. Pharmacogenes are a group of genes that are known to impact drug safety and efficacy depending on the variation within them. We have assessed the landscape of pharmacogenes in African populations, and found that there is significant variation not only distinguishing Africans from other global populations, but between African populations too. This diversity makes implementing precision medicine in Africa more complex. We undertook a detailed analysis of a gene that holds particular relevance for one such treatment - hydroxychloroquine. This drug has warnings for use in individuals with glucose-6-phosphate-dehydrogenase (G6PD) deficiency. Our analysis of G6PD showed that there is a common variant (rs1050828) in African populations that could impact clinical trials and treatment safety. This variant also shows large differences in allele frequency between African populations (e.g. 16% in Tsonga vs 0.8% in Xhosa, p=2.4x10-3). This talk unpacks ways to approach the pandemic while considering African genomic diversity.

*A prevaricator is a person who lies, or speaks falsely as to avoid truth.

12:40 hr

8 Leigh Crymble: Driving positive behavioural change during a pandemic using language, personality values and decision-making insights

Wits Business School

Behavioural Economics is increasingly being used to affect positive behavioural change through multiple health interventions ranging from medicine adherence and smoking cessation to healthier eating and improved physical activity[1]. Due to COVID-19, there is a great need for individuals to embrace non-pharmaceutical interventions including handwashing, social distancing and mask wearing[2]. Despite the rational knowledge that these interventions reduce the spread of the virus, many battle to adopt these new behaviours into their daily lives – a result of inherent behavioural biases coupled with generic, passive communication methods.

This submission offers a new approach to behavioural change using a framework that is currently in development – Behavioural Linguistics (BL). This multi-disciplinary approach combines *Critical Theory* (Linguistics), *Nudge Theory* (Behavioural Economics) and *Refined Theory of Basic Values* (Psychology) to 'nudge' sustained action in the fight against COVID-19.
This approach proposes the BL development of personalised communications tailored to multiple nudge language profiles to reduce behavioural friction and encourage increased COVID-compliance.

13:05 hr

9 Lerato E. Mohalajeng: Crowdsourcing: The Solution to Efficient Drug Development During Pandemics

School: Management

Firms in the pharmaceutical industry are characterized by inefficient R&D priorities, and as a result, high-pricing practices. These firms negatively impact the equitable availability and accessibility of medicines during pandemics. A subsequent increase in sales volume does not offset the price reductions required to make medicines affordable to a broader class of people in developing countries. Additionally, few medicines exist for 'neglected' diseases such as pneumonia, tuberculosis, malaria and recent microbial pandemics - which in most cases exclusively affect the developing world. This neglect is due to the lack of profitability paralleled with drugs sold to wealthier markets in the developed world. For the pharmaceutical industry, it is more profitable to sell medicines to the middle-and-upper-class at high prices than to sell cheaper drugs to a higher number of people. As a result of this profit-seeking behavior and inefficient drug development process; life-saving medicines, because they are too expensive, remain unaffordable and inaccessible for the majority of populations, globally.
In light of this, crowdsourcing is proposed as the potential solution for challenges faced by the pharmaceutical industry during pandemics. With the cost-reductions, efficiency

and time-saving advantages of crowdsourcing, an immense potential to propagate the equitable availability and accessibility of medicines in developing countries across the world exists.

13:30 hr

10. Melusi M. Makhoba: Recalibration of the marketing strategy during a pandemic

School of Economics & Business Sciences

The Covid-19 pandemic has required leaders to make decisions under considerable pressure. Many chief marketing officers have been acting as the "chief crisis officer" as they work to ensure their organization's survival and to manage the marketing environment of business.

Because there is no strategy for a crisis like Covid-19, chief marketing officers have had to manage largely by relying on their existing skills and personality traits. The researcher seeks to understand and develop a pandemic resistance marketing strategy and template to follow should the world ever find itself in a similar situation in future.

Research on marketing strategy has been carried out with perspectives both of marketing management and strategic management. Initial research in marketing strategy was devoted to development of models for strategy development which were essentially generic in nature and can be applied to large as well as small firms.

The researcher plans on adding to existing theory, by introducing new segmentation, target marketing and positioning variables, the researcher will also seek to add to the extended 7 P's of marketing a new P which will be pandemic. This recalibration of the marketing strategy is something that have never been done before in management sciences research. The researcher plans to highlight how a pandemic can be the innovative force for competition.

13:55 hr

11 Marifa Muchemwa: Family Changes and Child Maintenance Effect on Men's Mental Health in South Africa in the context of the COVID 19 Pandemic.

School: Social Sciences

Mental health problems such as depression are increasing among men in South Africa. Despite the considerable attention that mental health has received, men's mental health remains inadequately studied. There are indications that changing family situations and complexities surrounding child maintenance may be pertinent to men's mental health. Families in South Africa already had day-to-day challenges before the COVID 19 pandemic. It is important to examine the effects of family changes and complexities surrounding child maintenance in the context of the COVID 19 pandemic considering the stressful nature of the pandemic and how it has led to social, economic and emotional challenges. An explanatory sequential mixed method design will be used. A cross-sectional study using primary data collected in the Gauteng and Western

Cape provinces of South Africa will be conducted including focus group discussions. The study population will be men in South Africa aged between 18-64 years. The sample size will be 1025 men for the survey and 100 men for focus group discussions. This study will contribute to the existing body of knowledge on family welfare and mental health. By focusing on men only, the study brings attention to the scarce studies specifically directed at men's mental health.

30 September: Session 2

09:00 hr

12 Melanie Moodie: "Vaccine Voices"- the antidote to the pandemic of scientific misinformation

School: Pathology

The digital age has revolutionised the access and dissemination of information, while simultaneously providing a platform for the pandemic of misinformation —garnering mistrust in scientific research. Improved scientific communication is required to diminish this mistrust, promoting better education, and ultimately leading to better health outcomes (an example would be the current COVID-19 pandemic). Here I propose a novel educational tool/ awareness campaign to improve the understanding of vaccines and the immune system in the fight against disease. Vaccines would be presented as humanised characters with a "voice", where they speak on the challenges and successes, they face in trying to eradicate diseases. These "vaccine voices" would represent successful vaccines currently in use (smallpox, polio, tetanus, etc) or for diseases that currently no vaccine exists (HIV, CMV, universal influenza vaccine, etc.). The caricatures would address a range of topics, including vaccine manufacturing and testing, how they work, and why it can be challenging in some cases. Vaccine Voices would be available in different formats aimed at maximising engagement across age groups whilst facilitating reputable scientific communication on these immunology topics. This is envisaged to empower individuals to make informed healthcare decisions and less likely to fall prey to misinformation.

09:25 hr

13 Mwansa Ketty Lubeya: Impact of the COVID 19-Pandemic on delivery of the human papillomavirus vaccine to adolescent girls in Zambia

School: Public Health

Cervical cancer, caused by human papillomavirus (HPV), has high mortality and morbidity, with poorer nations having the highest burden. Zambia has one of the highest incidences, with about 2,994 women diagnosed with Cervical cancer annually, making cervical cancer the most prevalent female cancer in the country. The HPV vaccine has proved to be an effective strategy for cervical cancer prevention. In 2019, Zambia introduced a predominantly school-based national HPV vaccination program for girls aged 14. However, the COVID-19 PANDEMIC has threatened the potential

gains made by this vaccination program. Zambia, like many other countries, closed schools, a measure to mitigate the spread of SARS-CoV-2 infection. Unfortunately, at the scheduled time for the second round of vaccination in 2020, schools were closed. Instead, the vaccine was delivered through health facilities and outreach campaigns, strategies known to be less effective. Little is known about the impact of the COVID-19 PANDEMIC on the HPV vaccination programme in Zambia and associated factors. Therefore, the purpose of this study is to determine the extent to which the COVID-19 PANDEMIC has affected the HPV vaccine delivery and coverage, through a comparison of 2019 and 2020 HPV vaccination registers and key informant interviews to elicit challenges encountered.

09:50 hr

14 Ndivhuwo Shumbula: Surface enhanced Raman scattering/spectroscopy and its potential in early detection of diseases: Towards diagnostics and combating Covid-19 pandemic

School: Chemistry

Surface enhanced Raman scattering/spectroscopy (SERS) is a phenomenon/technique that enhances Raman signal of molecules. With this technique, the molecule of interest is attached to a substrate that can easily amplify the weak Raman scattered radiation to obtain highly enhanced signals. Noble metals such as gold (Au) and silver (Ag) in their nanoscale have proven to be the best SERS substrates. These nanomaterials possess a phenomenon called surface plasmon resonance (SPR) which is responsible for enhancing weak Raman signal by over a billionth order of magnitude. Therefore, SERS can easily analyse biological and single molecules.
SERS has previously been used as an early detector of disease such as TB and malaria. With the present health crisis of COVID-19 pandemic and other diseases that requires a special attention, it is crucial to have advanced, cost effective, fast, and user-friendly diagnostic devices in place. These could help in diagnosing the diseases while they are still in their asymptomatic and treatable stages. Our project showcases the potential of using gold nanoparticle as SERS substrate and how we can further fabricate a selective and sensitive SERS-based immunoassay that can be tuned to target a specific biomarker including that of COVID-19.

10:15 hr

15 Onyinye Jennifer Uwaezuoke: A neoteric biomaterial design for limiting mucous surface interaction with pandemic-causing viral proteins.

School: Pharmacy

Most pandemics are caused by predominantly protein elements and usually spread rapidly across borders. Interventions to contain pandemics focuses on prevention of contact with the pathogen, vaccination to prepare the body against the assaulting pathogen, and therapeutics for fighting an established pathogen. Unfortunately,

preventing contact is particularly difficult for some body parts such as the eye and including some of these measures into a daily routine may be cumbersome. Additionally, current interventions such as the use of face masks rarely offer protection to the eye, which has been shown as a viable portal of entry for viral pathogens such as the SARS-CoV-2 and HIV. Most viruses establish infections by first attaching to the host cells through their proteins. Therefore, my current research thrust focused on developing protein resistant biomaterial for drug delivery applications in the ocular field can be extended by designing biomaterials with sufficient protein resistant properties to possibly prevent the interaction of viral proteins with mucous membranes such as the eye. The biomaterials may be presented as an easy-to-use eye drops that form a protective breathable gel over such membrane, hence providing a novel tool in preventing direct contact with viral proteins during susceptible pandemics and impacting transmission.

10:40 hr

16 Ruth Stephenson: The importance of wastewater treatment during a pandemic and the role that constructed wetlands can play in rural communities.

School of Chemical and Metallurgical engineering

Rural communities are the least prepared to deal with the effects of the pandemic. Lack of healthcare facilities and sanitation services make it more difficult for these communities to follow containment measures. The SARS-CoV-2 virus has been found in human waste and consequently in wastewater and at water treatment plants. Many rural communities lack a wastewater treatment system and as a result the possibility of virus transmission through human waste is increased. The implementation of a wastewater treatment system could mitigate the risk of one of the transmission pathways. Constructed wetlands are a low cost and easy to maintain wastewater treatment system which can be implemented on a small scale to serve several households or even a small community. It could be possible to install constructed wetlands in rural communities to reduce the spread of the SARS-CoV-2 virus through human waste and in doing so drastically reduce one of the transmission pathways of the virus. This would make it easier for communities to cope with the containment of the virus and hopefully reduce the strain on the limited healthcare services these communities have.

11:10 hr

17 Seyram Pearl Kumah: African financial markets in a storm: Cryptocurrency safe havens during the COVID-19 pandemic

Wits Business School

The concept of an investment safe haven is motivated by investor loss aversion, where investors are more concerned with avoiding losses than any associated prospective gains. This loss aversion motivates investors to seek out safe haven assets, i.e. assets that are uncorrelated or negatively correlated with traditional assets during periods of

market turmoil. Various safe haven assets have been established at short to medium horizons, including gold, currencies, long dated treasury bonds and, most recently, cryptocurrencies. The COVID-19 pandemic provides the first widespread bear market conditions since the inception of cryptocurrencies. We analyse the relationships between the largest cryptocurrencies and traditional assets classes (stocks, fiat currencies, gold, and crude oil) and such time-varying realisation as to the scale of the economic shock centralised within the rapidly-escalating pandemic. We employ wavelet-based methods to explore the safe haven properties of cryptocurrencies for African markets and the frequency domain spill over index to investigate the direction of spill overs across the assets during the COVID-19 bear market. As policy decisions are frequency-dependent, the horizon-based result is clearly important since it will highlight the need for regulatory policies to be directed at the assets across horizons to reduce global risk.

11:35 hr.

18 Tamlyn Naidu: Pandemic Prevention using Early Detection Techniques in Wastewater: Using our Sewage System to Curb Infection Rates

School: Chemical and Metallurgical Engineering (Wastewater Engineering)

The transmission of many pathogen-based illnesses is rampant as it can occur between people who are asymptomatic and who will spread an illness without knowing they are infected, causing outbreaks, which can lead to epidemics and - in extreme cases - pandemics. In the absence of cures/vaccines, procedures are established to limit the spread of pathogens but in many cases these measures severely affect economic activity. On the other end of the spectrum restrictions may not be enforced early enough causing increased transmission and more illnesses/deaths. Realistically, most infected people will not be tested to confirm contraction of an illness – meaning accurate measures of infection cannot be obtained and forcing authorities to theorize if a pathogen is widespread and whether stricter procedures should be stipulated to reduce transmission. However, direct testing is not the only way to confirm infection rates - infected people can shed up to 10^{12} viral particles/gram of faecal matter, even while asymptomatic, which enters an area's wastewater treatment plant (WWTP). Monitoring viral load at WWTPs would therefore allow for greater accuracy of infection statistics, allow early detection and thus prevention of outbreaks, and give countries a better representation of where infections are located. The effectiveness of viral detection by in-situ biosensors in WWTPs is presented in this research, with fluorescence-based analysis being deemed the most effective at detecting the presence of a viral pathogen and the onset of a controllable outbreak.

12:00 hr

19 Tumelo Moshoette: DNA ORIGAMI: The molecular art of getting viruses 'to fold'

School: Molecular Medicine and Haematology

We've all been affected by it, we've all had to adapt to the "new normal". It's one of the biggest killers in Sub Saharan Africa and attempts to cure it have not been successful. This deadly virus is known to us as HIV. But what does origami, the Japanese art of folding paper, have to do with HIV? What if we were to take long strands of DNA, fold them, like some form of DNA origami to create "nanorobots" that can be designed to target and actively deliver anti-HIV drugs to non-active, HIV-1 infected cells that have successfully evaded the body's immune system and are shielded from current therapeutics (ARVs)? This ingenious technique combines the physical, chemical, biological and computer science fields, for the successful targeted delivery of cancer therapeutics, antimicrobials to antibiotic resistant bacteria and HIV-1 vaccine immunogens. Here, I propose the engineering of novel DNA-origami nanorobots for the purpose of targeting non-active, immune/drug evading HIV-1-reservoir cells as a critical component of an HIV-1 cure strategy.

12:25 hr

20 Vieviene. A. Antifon: IS IT TIME FOR CLIMATE PLANNING FOR THE SAKE OF PUBLIC HEALTH? A MESSAGE FROM THE COVID-19 PANDEMIC

School of Law

Climate change has a significant impact on public health, but the exact extent of that impact remains unknown due to the absence of a real world event to put scientific predictions into perspective. The result is that, public health policy has been predicated on some erroneous generalizations about the impact of climate change, creating a reactive rather than a proactive response to global climate change and public health governance.

Since the disruption of the Covid-19 pandemic provides the missing real world perspective on which the extrapolation of scientific data on public health and climate change can occur, this study postulates that climate planning through international law should be interrogated through a public health lens rather than a purely legal perspective as is the case in conventional research.

Using scientific research which stops at identifying the complexities, and uncertainties of climate change on public health, the significance of this paper is to strengthen global climate change governance, clarify the role of law to climate change-public health discourse in view of its multidisciplinary and multifactorial character, and the benefits that could be harnessed for public health and the environment in this critical season of the Covid-19 pandemic.

12:50 hr

21 David M. Witelson: Pandemic: indigenous southern African notions of unstoppable disease and how to fight it

Institute: Rock Art Research Institute

School: Geography, Archaeology, and Environmental Studies

The COVID-19 pandemic has brought the world to its knees. The challenge we now face is disunity. Population statistics guide global strategies, but we do not fight together. We need a response that is 'of all people' in the original sense of 'pandemic'. Health scientists are doing their bit. What is needed is social commitment to what they say, some reminder of everyone's responsibility. That symbol is to be found in our national coat of arms which points us, via the two San rock art images provided by Wits' Rock Art Research Institute, to cooperation. Using performance theory and striking examples of San rock art and ethnography, I show that we can supplement global strategies with southern African San healing philosophies. We stand to learn from communal San healing practices which require total social cooperation in fighting off the ever-present 'pandemic' caused by malevolent spirits of the dead that shoot 'arrows of sickness' (disease) into people. Men, women, children and even casual visitors participate cooperatively in San healing. No one is excluded. The same values are proclaimed in rock art. Ultimately, we must heed the |Xam San words of our national motto, *!ke eː |xarra ǁke*, 'People who are different come together'.

13: 15 hr

22 Zakhele Ndala: **Redesigning the face mask for the inactivation of airborne viruses**

School of chemistry

Airborne pathogens are viruses that can be transmitted through small droplets that travel through the air. These airborne viruses include the common cold, measles, and the influenza virus. There is mounting evidence that suggests SARS-CoV-2 may be an airborne pathogen. One of the best protective devices against such viruses is the face mask. Face masks are made of interwoven fibres that can arrest the particles as they move through the matrix of the mask. We propose the use of nanomaterials to design a new mask that introduces a new capability that will increase the efficacy of the mask. This face mask will have the added advantage of being able to render any virus trapped in the mask matrix inactive. The mask will contain three components. These components will perform three core functions (i) Polydopamine nanofibers will act to trap aerosol particles (ii) The Ag and Cu nanoparticles which are effective in inactivating viruses will be used for that purpose (iii) The $MoSe_2$ nanoflowers would be used to immobilize the Ag or Cu nanoparticles and prevent them from agglomerating and therefore becoming ineffective. This innovation could be crucial in curbing pandemics arising from airborne pathogens.

Close of event:

13:40 Professor Robert Muponde, Director: Postgraduate Affairs Office