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MESSAGE FROM THE CHANCELLOR

Ms Nonkululeko Nyembezi

Heartiest congratulations to the class of 2019/2020.

Today you have achieved what has been so far the driving ambition in your life. It is a monumental achievement and you have earned the right to feel good about it. It is your time, so stop and take a moment to savour it. Give yourself a pat on the back and share the special moment with your family and friends who have supported you along the way.

The real value of a good education goes way beyond amassing knowledge. Over and above knowledge, what DUT has hopefully imparted to you is awareness of what is real and essential to be a good person. As you leave the safe space of a university campus, there will be many twists and turns you have to navigate. In doing so, don't give up on your values but be willing to adapt to life's ever changing circumstances.

March to your own drum. In this world of social media, comparing yourself to others has become an occupational hazard. Have the courage to choose your own path based on whatever your intuition commands you to do. You will not always be sure what is the right path to choose. But if you are true to yourself, that inner voice will eventually come to your rescue and indicate the right one for you, however tentatively. Follow your heart even if it takes you away from the well-worn path. Dream big and honour your dreams.

As important as this is, it is unlikely to be the most important moment in your life. Other challenges will come. So you have to keep learning thus dedicating yourself to life-long learning. This takes commitment and may lead you to places you can hardly conceive of today. Naturally there are bound to be failures along the way as you push ever higher. At those times, it would be good to recall Churchill's timeless words: "Success is not final; failure is not fatal; it is the courage to continue that counts." And while you're at it, take the time to learn from those failures — they are by far the greatest teachers.

As you graduate today and embark upon the next phase of your life, what I wish for you is that you find work that you love. For it is only by doing so that your creative juices get stimulated so you excel and produce great results. Don't lose faith if at first you don't find this; keep looking. And remember above all else that life happens at the point of movement, not thinking, worrying, imagining, planning, talking or whatever else. So take action.

All of us at DUT are enormously proud of you.



UMYALEZO OVELA KUSHANSELA

Nkz. Nonkululeko Nyembezi

Izilokotho ezinhle ezibhekiswe eklasini lonyaka wezi-2019/2020.

Namuhla senihlomule ngalokho ebenikusebenzela empilweni. Kuwumhlomulo omkhulu lo futhi eninelungelo lokuthi niziqhenye ngawo. Yithuba lenu leli, ngakho-ke yekani yonke into bese niyalithokozela. Zimbambatheni emahlombe ngokuziqhenya bese niwuthokozela lo mzuzu okhethekile nemindeni yenu kanye nabangani akade beniseka indlela yonke.

Ubuhle bemfundo eseqophelweni eliphezulu buhamba buze budlule ulwazi oluzuziwe. Ngaphezu kolwazi, i-DUT enethemba lokuthi inihlomulise ngalo, iphinde yanifundisa futhi ukuthi yiziphi izinto ezibalulekile ezinganenza nibe ngabantu abaqotho. Njengoba seniphuma kula magceke aphephile ale Nyuvesi, zizoba ziningi izinselelo namajika enizohamba kuwo. Uma nibhekana nalezo zinselelo futhi nijika lawo majika nize ningadikibali bese nilahla lokho okubalulekile kinina kodwa nizijwayelanise nezimo zempilo ezihlale ziguquguquka njalo.

Yenza lokho okholelwa kukho. Sekuyingozi kakhulu ukuziqhathanisa nabanye kulesi sikhathi sezinkundla zokuxhumana esiphila kuso. Yiba nesibindi sokuzikhethela eyakho indlela kuye ngokuthi unembeza wakho ukutshela ukuthi yenzani. Ngeke uze ube nesiqiniseko ngaso sonke isikhathi ukuthi indlela okumele uyikhethe iyona yiphi, kodwa uma uneqiniso kuwena uqobo, unembeza wakho yiwona oyokutakula ngokukuhlonzela okumele ukwenze. Yenza lokho

okusenhliziyweni yakho ngisho noma ngabe kuthiwa lokho kukuqhelisa kulokho okujwayelekile. Yiba namaphupho nezifiso ezinkulu empilweni bese wenza isiqiniseko sokuthi lawo maphupho uyawafezekisa.

Yize lo mcimbi ubalulekile, kepha lesi ngeke kube yisigaba esibaluleke ukuzedlula zonke empilweni yakho. Zisazovela nezinye izinselelo. Ngako–ke, kumele uhlale ufunda futhi uzinikele ekutheni uyohlale ufunda impilo yakho yonke. Lokhu kusho ukuthi kumele ube nokuzinikela nokuzikhandla futhi kungakuthatha kukubeke ezindaweni ongakaze ucabange ukuthi uyoke ufinyelele kuzo. Kuzokwenzeka kube khona izingqinamba endleleni ngesikhathi uzama ukhuphukela phezulu. Uma izikhathi ezinjalo zikufica, kuyoba kuhle ukuthi uzikhumbuze amazwi angasoze abuna ka-Churchill athi, "Impumelelo kayinaso isiphetho, ukungaphumeleli akusho ukuphela kwempilo; kepha yisibindi sokuqhubeka esibaluleke kunakho konke." Uma uhlangabezana nalezo zimo ezinjalo, zinike isikhathi sokuthi ufunde kulawo maphutha – yiwona ayokuqinisa ukhakhayi.

Njengoba nithweswa iziqu namuhla futhi nidlulela esigabeni esilandelayo sempilo, enginifisela kona ukuthi nithole umsebenzi eniwuthandayo, ngoba yikona lokho okuzothuthukisa ubuhlakani benu nibe yizingweti niphinde nikhiqize imiphumela emihle. Ningalilahli ithemba uma lokhu kungenzeki ngokushesha, niqhubeke nokubheka. Nikhumbule futhi ukuthi ngaphezu kwakho konke lokhu, impilo iqhubeka uma kunomyakazo oya phambili, hhayi ngokucabanga nje kuphela, ngokuzikhathaza, ngokuzindla, ngokuhlela, nangokulibala ukukhuluma nje kuphela. Ngakho–ke, sukumani nizithathe!

Sonke e-DUT siyaziqhenya ngani.



MESSAGE FROM THE VICE - CHANCELLOR AND PRINCIPAL

Professor Thandwa Zizwe Mthembu

Please accept my heartiest congratulations on what is a milestone in your life, your university graduation day. I am extremely proud of you and your achievements. You are, indeed, one of a very small group of about 20% of your peers who have diplomas and degrees. You are the cream of the crop!

The degree/diploma that is being conferred on you today will certainly help to broaden your horizons, open new opportunities and position you to play a meaningful and positive role in shaping your future and that of your family. With higher education being a public good, too, the investment you and your family have made in your education will also make a significant contribution to your community, our region, our country and the entire world.

The world will be looking towards you, armed with your knowledge, skills, innovation and entrepreneurial flair, to build on the achievements of those who opened the way before you, so that you continue the journey to make South Africa a better place. You will have to actively play your part to improve our country's economic performance, to enhance our political environment, to nurture our social cohesion and to prevent the degeneration of our society that is being exacerbated by violence, crime and corruption. We place a lot of faith in you. We are confident that you will not disappoint us.

Your graduation today means more than just receiving a piece of paper that confirms your academic prowess. Many of you have had to grapple with severe personal setbacks and challenges over the course of your study. However, you have become trailblazers in your families, villages and townships. Keep striving to grow and prosper. And, always remember to do things you are entrusted with the right way, with dedication, diligence, honesty, integrity, and with excellence and accountability.

Never forget that it takes a lifetime to build your reputation and only a moment to destroy your credibility. So, always try and ensure that you do not disappoint yourself.

Your qualification will be inconsequential, unless your knowledge and skills are employed to solve the problems that are evident in our communities and particularly, for the most vulnerable members of our society. As a result, our measure of student success cannot be limited to throughput rates alone. Ultimately, it is the quality of our graduates, the knowledge and skills that you have earned that will demonstrate the utility of your qualification.

We urge you to think carefully about the legacy that you will bequeath to your children and to your grandchildren, and to the country at large. It is my fervent wish that your legacy must be one of hope and not despair. It should be one of great values and ethics, and not bigotry and hate. It should be a legacy of peace, not violence. It should be a legacy of renewal, innovation and entrepreneurship, and not degeneration. It should be a legacy of development and not of wanton destruction. Let your efforts build South Africa, let them grow the African continent and let them guide our world into a safe and prosperous future.

As we unleash you to the world with your new knowledge and skills, innovations and entrepreneurial flair, we trust that you will choose to live and lead a value-driven, principled and ethical life. Despite whatever personal challenges you may face, always stay on the righteous path. Most importantly, always remember to savour this moment and the many other exciting ones that lie ahead.

This is your day! Congratulations to you, your family, your friends and to your community. You have made us proud. Here's to your continued success and good fortune...



UMYALEZO OVELA KUSEKELA-SHANSELA

uSolwazi Thandwa Zizwe Mthembu

Ngivumeleni ngedlulise ukuhalalisa kwami okuvela ekujuleni kwenhliziyo kulesisigaba esenifike kuso esiwusuku lokwethweswa kwenu iziqu. Ngiyaziqhenya kakhulu ngani ngokuhlabana kwenu. Niyingcosana kakhulu engamaphesenti athi awabe ngama-20 yabaneziqu phakathi kontanga yenu bephelele. Ngalokhu-ke, niyizingqwele phakathi kwabo!

Iziqu enizethweswa namuhla nakanjani ziyonisiza kuntwele ezansi, zininike amathuba amasha futhi zinimise ngomumo ekubambeni iqhaza elifanelekile ekwakheni ikusasa elingcono kini nasemindenini yenu. Njengoba imfundo ephakeme ifanele ibe nomvuzo nasemphakathini, lokho okuyizindleko eningene kuzo kanye nemindeni yenu nikhokhela lemfundo, kuyoba ngumnikelo obalulekile emphakathini wenu, isifunda senu, kuleli lethu lengabadi kanye nomhlaba jikelele.

Umhlaba wonke umagange njengokuba senihlonyisiwe ngolwazi, amakhono, nobuchwepheshe ukunibona nakhela phezu kwalokho okuchunyiswe yizingqalabutho zenu ukuze niqhubeke njalo nenze iNingizimu Afrika ibe yizwe elingcono. Kumele nikhuthalele ukubamba iqhaza nifukule umnotho wezwe lethu, nijiyise ezombusazwe, ninakekele ubunye kwezenhlalo nilwe nokufekela komphakathi wethu okubhejezelwa wudlame, ubugebengu kanye nenkohlakalo. Lonke ithemba lethu lisemagxalabeni enu. Sifunga siyagomela sethembele ekuthenini ngeke nize nisiphoxe.

Usuku lwenu lokwethweswa iziqu lusho okungaphezulu kokwamukela nje isiqeshana sephepha esiqinisekisa ulwazi eniluzuzile. Ngenkathi befunda, abaningi benu bedlule ekukhandlekeni belwa nezingqinamba kanye nezinselelo ezagadla zephukela kubo. Nokho, seniphenduke izinkombandlela zamaqhawe emindenini, emiphakathini nasemalokishini enu. Zimiseleni ukukhula ngokuphumelela. Futhi, nikhumbule njalo ukwenza enikwethwesiwe nikwenze ngokufaneleyo, ngobulungiswa, ngokuzinikela, ngokukhuthala, ngokwethembeka, ngobuqotho, ngokucola nangokulungela ukuziphendulela ngenikwenzile. Ningakhohlwa nanini ukuthi kuthatha impilo yakho yonke ukuzakhela igama kodwa kuba ngumzuzwana nje ukulinukubeza noma ukulibhidliza. Ngakho-ke zamani futhi niqinisekise ukuthi ningaziphoxi nizidumalise ngokwenu.

Iziqu zenu ziyoba yize uma ulwazi lwenu namakhono kungasetshenziselwa ukuxazulula izinkinga ezithe chithi saka emiphakathini yakithi ikakhulukazi kulabo bethu abantekenteke manxa onke ekuphileni nasekuhlaleni kwabo. Ngenxa yalokho, isilinganiso sethu sokuphumelela kwabafundi singekalwe ngokukhiqiza kwethu iziqu kuphela. Seziphelele zonke izinto, okuyoqinisekisa imivuzo ngeziqu zenu, yiqophelo eliphezulu lobufundiswa benu, nolwazi namakhono eniwazuzile eniyowatshala avunwe yimiphakathi yenu.

Siyaninxenxa ukuthi nicabangisise ngefa lamagugu eniyolishiya ezinganeni zenu, kubazukulu benu nasezweni lonke. Kuyisifiso sami esijulile ukuthi ifa eniyolishiya kube ngelokunika ithemba kungabi ngelokudangalisa umphakathi, usale ukhexe imilomo ngani. Kumele libe ngelamagugu agxilile nokuziphatha ngobuqotho, hhayi elokucwasa kanye nenzondo. Kumele kube yifa lokuthula; hhayi lodlame. Kumele kube yifa lokuvuselela, ukuchumisa nokwakha amathuba emisebenzi; hhayi lokufekelisa. Kumele kube yifa lokuthuthukisa; hhayi elokucekela phansi, nihliphiza, niblidliza. Imizamo yenu makube ngeyokwakha iNingizimu Afrika, mayikhulise izwekazi lase-Afrika futhi mayiholele umhlaba jikelele ekusaseni eliphephile nelinempumelelo.

Njengoba sesininikela siniphonsela emhlabeni nolwazi lwenu olujulile kanye namakhono, ubuchwepheshe nemiqondo yokusungula nokuchumisa kanye nokwakha amathuba emisebenzi, sinethemba lokuthi nizokhetha ukuphila impilo eluswe ngamagugu, imigomo yempilo nobuqotho. Nakuba ningabhekana nezingwadla zezinselelo eziyonibheka ngqo, hlalani njalo endleleni elungileyo, enobuqotho nobulungiswa. Okubaluleke kakhulu, nikhumbule njalo ukulazisa nizitike futhi ngaleli thuba lanamhlanje lokwetheswa kwenu iziqu kanye namanye amathuba athokozisayo asazofika.

Lusuku Iwenu Iolu! Halala kini, emindenini yenu, kubangane benu nasemiphakathini yenu. Siyaziqhenya ngani. Sinifisela impumelelo engenamkhawuko nenhlanhla eyochumisa yonke imizamo yenu.



MESSAGE FROM THE PRESIDENT OF CONVOCATION

Mr Siyabonga Vezi

Congratulations on your hard earned achievement!!

One's graduation is a time of celebration. A victory to be shared with family and friends. Sadly, Covid-19 has disrupted a number of our plans and operations, including the all-important Spring graduation ceremonies. This is a situation nobody could have foreseen. Globally, we are undergoing immense adjustments. However, Covid-19 cannot take away from you, the immense sense of accomplishment and fulfilment of achieving your goals, for some under very trying circumstances. We applaud and commend your hard work and sacrifice that has culminated in you securing a place to being a productive, contributing member of society.

Remain positive. Remain steadfast in your goals. I am confident that the education and life skills acquired at DUT will hold you in good stead as you journey forward and carve out a successful career path. You have the power to shine brightly amidst challenging circumstances, including the likes of this pandemic. So go forth and conquer by being a beacon of hope and positive change in your communities. South Africa needs individuals like you to provide solutions to our societal challenges.

Your alma mater, DUT, has answered the call to provide assistance to the most vulnerable in the DUT community by establishing the Covid-19 Solidarity Fund: Committed, Compassionate. These funds will be utilized for care and support for those in the DUT community whose lives have been severely impacted by Covid-19. I encourage you to support this fund by pledging towards the DUT Covid-19 Solidarity Fund. Let's do the best we can, no matter how little it is. Collectively, it will make a difference. Together, we shall overcome the devastating effects of the virus.

To donate go to the DUT website (www.dut.ac.za), click on DUT Solidarity Fund and follow the prompts.

The virus has forced us to reassess our priorities. Our health and those of our loved ones are of paramount importance. So I would encourage you to continue practicing social distancing, washing your hands thoroughly for at least 20 seconds and always put on a mask when you step out.

Current challenges should not destroy vision, instead they must empower, drive each one to be creative and encouraged to find solutions.

Stay safe. Stay blessed.



UMYALEZO OVELA KUMENGAMELI WE-CONVOCATION

uMnumzane Siyabonga Vezi

Halala ngomvuzo wokuzikhandla kwenu!

Ukwethweswa komuntu iziqu kusuke kuyisikhathi sokubungaza. Kuyimpumelelo okumele umuntu ayijabulele nomndeni kanye nabangani. Okubuhlungu yikho-ke ukuthi igciwane elaziwa nge-Covid-19 seliphazamise zonke izinhlelo zethu kanye nokusebenza, okubandakanya nemicimbi ebalulekile yokwethwesa abafundi iziqu evamise ukuba seNtwasahlobo. Okubuhlungu yikho-ke ukuthi igciwane elaziwa nge-Covid-19 seliphazamise zonke izinhlelo zethu kanye nokusebenza, okubandakanya nemicimbi ebalulekile yokwethwesa abafundi iziqu evamise ukuba seNkwindla. Lesi yisimo okungekho noyedwa obengakwazi ukusiqagula singakenzeki. Umhlaba wonke ungaphansi kwezinguquko ezithile. Yize kunjalo, leli gciwane i-Covid-19 ngeke silivumele ukuba linephuce umuzwa onzulu wokufinyelela nokufezekisa amaphupho enu kwabanye benu ngaphansi kwezimo ezinzima. Sikushayela ihlombe futhi siyakuncoma ukusebenza ngokuzikhandla nokuzinikela kwenu osekunibeke endaweni yokuthi nibe amalungu omphakathi akwazi ukwenza umsebenzi omningi, nonamagalelo amahle.

Hlalani ethembeni. Nigxile emaphupheni enu. Ngineqholo futhi anginanazi ukusho ukuthi imfundo kanye nempilo khono eniyifunde e-DUT kuzoba usizo njengoba nisaqhuba uhambo oluyaphambili nendlela enizoyithatha yokuqhubekela phambili emikhakheni yenu yemisebenzi. Ninawo amandla okuphumelela ezingqinambeni eningahlangabezana nazo, nesingabala kuzo leli gciwane i-Covid-19. Qhubekelani phambili ninqobe ngokuba inhlansi yethemba noshintsho olwakhayo emiphikathini eniphila kuyo. INingizimu Afrikha idinga abantu abanjengani ekunikezeleni izixazululo ezingqinambeni ezikhungethe imiphakathi yethu.

Inyuvesi ebenifunda kuyo, i-DUT isiphendulile ekhweleni lokunikezela ngosizo kulabo ababuthaka nabangavikelekile emphakathini wesikhungo i-DUT ngokuthi isungule iskhwama sesibonelelo esibizwa nge-DUT Solidarity Fund: Sizinikele, Sikhombisa uzwelo nokunakekela. Le mali

izosetshenziselwa ukunakekela iphinde ixhase labo abathe impilo zabo zaphazamiseka ngenxa ye-Covid-19 emphakathini wesikhungo i-DUT. Ngiyanigqugquzela ke ukuba nixhase lesi sikhwama ngokuphosa esivivaneni esiyi DUT Covid-19 Solidarity Fund. Masenze konke okusemandleni ethu, ngisho ngabe kuncane kangakanani. Ngokubambisana sisonke singawenza umehluko. Sisonke sizoyinqoba imiphumela enomonakalo omkhulu edalwe yileli gciwane.

Ukunikela ngofisa ukukufaka ungaya kwiwebhusayithi yase-DUT (www.dut.ac.za), ungene kwi-DUT Solidarity Fund ulandele imiyalelo.

Leli gciwane lisiphoqe ukuba sihlole kabusha izinto ezimqoka. Impilo yethu kanye neyalabo abathandiweyo bethu yikhona okusemqoka kakhulu. Ngakho-ke, ngithanda ukugqugquzela ukuthi niqhubeke nokuqhelelana emphakathini, nigezisise izandla zenu okungenani imizuzwana engu-20 bese nihlezi nifake izamfonya uma niphumela ngaphandle.

Izingqinamba esibhekene nazo kulesi sikhathi mazingashabalalisi amaphupho enu, kunalokho mazinihlomise, nenze omunye ngamunye ukuba aqhamuke nomqondo ongajwayelekile futhi nikhuthazeke ekutholeni izixazululo.

Zigcineni niphephile. Nihlale nibusisekile.

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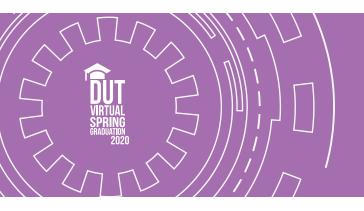
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Faculty of **Applied Sciences**

Degree of Doctor of Philosophy in BIOTECHNOLOGY

YADAV Deepti

Title of Thesis

Engineering of small laccase (SLAC) from *Streptomyces* coelicolor for application in biocatalysis and surface functionalization

Summary

The recent upsurge in the global demand for industrially relevant enzymes, has necessitated the need for robust and sufficient enzyme stocks for various applications. In this respect, the small laccase (SLAC) from Streptomyces coelicolor A3(2) has been attracting considerable attention mainly because of desirable characteristics such as activity at high temperatures and alkaline pH, and relative stability against common enzyme inhibitors encountered in industrial processes. However, low yield from natural hosts, low catalytic efficiency and lack of reuse capability are some of the technological barriers that tend to limit the industrial application of the SLAC. In the present study, strategies were developed to engineer SLAC for potential industrial application. The strategies included site directed mutagenesis, immobilisation, recombinant protein production, and the use of single and dual promoter systems for secretory expression of the enzyme. The produced enzyme was then applied in the degradation of various environmental pollutants and in surface functionalisation of selected biopolymers. This is the first report on the secretory expression of SLAC in Pichia pastoris. To facilitate reusability of SLAC, the enzyme was immobilised onto silane-functionalised magnetic nanoparticles.

This research resulted in three manuscripts, one was published in the *International Journal of Biological Macromolecules* (IF=5.2), the other two are currently under review. The research was also presented at national and international conferences.

Supervisor Co-Supervisors Prof T Kudanga Dr N Mchunu Dr M Le Roes-Hill

Degree of Doctor of Philosophy in FOOD AND NUTRITION

MKHIZE Nkumbulo Xolile Fairlady

Title of Thesis

Addressing food and nutrition insecurity through the development and implementation of an agricultural and nutrition education programme on legumes for older farmers living in Mariannhill KZN, South Africa

Summary

The aim of the study was to determine the levels of and address the food and nutrition insecurity status of selected previously non-legume producing elderly farmers as part of an intervention study. The phases of the study included diverse legume production, nutrition education and the biomedical effect of the consumption of the legumes on nutritional status. The data informed the findings of both the baseline and the intervention phases of the study. The red kidney bean (Phaseolus vulgaris L) was the most preferred legume with a high significance (p=0.001) amongst the six legume varieties produced. Legume consumption improved significantly (p=0.000) in the experimental group (EG) and the Dietary Diversity Score (DDS) of the legume food group increased with a mean (±SD) Food Group Diversity Score (FGDS) from $2.4(\pm 1.35)$ to $5.7(\pm 2.56)$ while the control group (CG) demonstrated a FGDS of 3.0 (SD±1.82). The EG showed a nutrient improvement at 5.0% significance level for blood glucose (p=0.038) and cholesterol (p=0.008). The study intervention positively impacted the food and nutrition insecurity status of these farmers whilst also establishing a sound foundation for future research and interventional strategies.

The candidate has presented findings in two international conferences and submitted two papers for publication.

Supervisor

Prof C E Napier

Co-Supervisors Prof W H Oldewage-Theron

Prof K Duffy

Degree of Master of Applied Science in BIOTECHNOLOGY

GASA Nomalanga Petronella

(Full Research)

Title of Dissertation

Evaluation of the effect of influent ammonium: nitrite ratio on anammox reactor efficiency

Supervisor Prof F Bux
Co-Supervisors Dr S Kumari
Dr OO Awolusi

LANGA Cebeni Nkosihawukile

(Full Research)

Title of Dissertation

Characterisation of recombinant beta-glucosidases from *Thermomyces lanuginosus* SSBP and investigation of their synergistic potential in cellulose hydrolysis

Supervisor Prof K Permaul Co-Supervisor Dr N P Mchunu

MASIKA Wendy Snoyolo CUM LAUDE

(Full Research)

Title of Dissertation

Isolation and characterisation of *Bacillus* spp. for use in the remediation of petroleum waste residues

Supervisor Prof T Kudanga Co-Supervisors Dr S Ramchuran Dr G Moonsamy

Degree of Master of Applied Science in

CHEMISTRY

GCOLOTELA Zodidi

(Full Research)

Title of Dissertation

Fabrication of Google-trackable colorimetric test strips for detecting water leakages

Supervisor Prof PS Mdluli Co-Supervisor Dr M Mlambo

Degree of Master of Applied Science in FOOD AND NUTRITION

BODIN Shenaye Dale

(Full Research)

Title of Dissertation

Food intake, socio-economic factors and health status of free-living, white residents in an elderly residential facility in Morningside, Durban

Supervisor Prof C E Napier

Degree of Master of Applied Science in FOOD SCIENCE AND TECHNOLOGY

MOODLEY Suggessan

(Full Research)

Title of Dissertation

Hypoxis colchicifolia as a potential nutraceutical to address non-communicable diseases

Supervisor Prof JJ Mellem Co-Supervisor Prof H Baijnath

Degree of Bachelor of Technology in

CHEMISTRY

DEWRAJH Alisha

JOHNSON Yolanda Janett

MPUNGOSE Nondumiso Ntombizandile

NGEMA Simfumene Alex

SITHOLE Sandile

ZULU Zama Rosemary

Degree of Bachelor of Technology in CONSUMER SCIENCE: FOOD AND NUTRITION

MCHUNU Samkelisiwe Senamile S'bongokuhle

MPUNGOSE Nondumiso Nontobeko

Degree of Bachelor of Technology in

TEXTILE TECHNOLOGY

MGABHI Sinokubonga NTUZELA Lindokuhle Edward VEZI Mlungisi Emmanuel

Diploma in

ANALYTICAL CHEMISTRY

BALFOUR Lwazi Thamsanqa Diligent

GABELA Mlondolozi SITHOLE Zenzele Sihle

Diploma in

NAUTICAL STUDIES

MAKHANYA Nompumelelo Khanyisile

MKHWANAZI Sanelisiwe Hazel
MOSHESH Ntombifuthi
NTINTILI Sibongiseni
NTSHELE Khanyisani

Diploma in

SHIPPING AND LOGISTICS

BAFO Bulelwa Patience
DLOMO Nomvelo Nompilo
GABELA Phindile Phumla

GUMEDE Zama KARRIM Uzayr

MADIDE Siphesihle Goodenough

MNCUBE Zandile Zanele

MOLEFE Linda
NAIDOO Prinusha
NDIMANDE Thabile

NKOSI Nosipho Wendy

NTULI Nkosingiphile Nomfundo

POTELWA Xola Lisa RAHIM Naadiyah ZONO Lulama

Diploma in

TEXTILE TECHNOLOGY

HADEBE Thubelihle Lumka

SHABANGU Thembeka

National Diploma in BIOTECHNOLOGY

KHAWULA Nkosingiphile Alex
KHUMALO Sibusiso Fortune
LEMBEDE Nonhlanhla
MALATSI Matshidiso Anah
MOLEFE Lesley Tisetso
MPANGELA Skhulile Fortunate
MTHEMBU Mayenziwe Nomvuselelo

MTHIMKHULU Senzekile NGCOBO Andile

NKONYANA Mbali Camelia

National Diploma in FOOD TECHNOLOGY

NANI Bulela

National Diploma in HORTICULTURE

MZIMELA Siphephelo Francis

National Diploma in MARITIME STUDIES

BIAHUTE ESTRADA Ricardo

CELE Gcinuthando Nokubonga FISHER Tameeka Chandré GEBASHE Sandile Khehlezi GUMEDE Nonhlonipho Xoliswa HOUGHTON Benjamin Grant JAMA Hassan Hersi JOHANNES Kim Lindsey

KHAMBULE Sthabile Ayanda Busisiwe

KHUMBUZA Charles Thabiso KHWELA Mluleki Mark KONDOMBOLO Dione Nancy LUTSHABA Mbalenhle

MADIKIZELA Nkcubeko Howard
MAGAGULA Thobani Mondli
MAHAYE Senzosenkosi
MAJOLA Nomvuyo Sharon
MAJOZI Mthokozisi
MBHELE Bonile Francis
MFEKAYI Xolisile

MPUNGOSE Thabile Jabulisiwe
MTOLO Thandeka Beauty
NGOMANE Mandisa Felicia
SOKHULU Thabiso Siphesihle
VILAKAZI Ntando Muzuvukile

*XAKI Phakamile

Perseverence CUM LAUDE

XULU Nosipho

ZONDO Sbonelo Mhlabunzima

National Diploma in SPORT MANAGEMENT

BOOI Siyabonga

NTULI Mthokozisi Nhlakanipho

Innocent

SHEZI Simphiwe Emmanuel

SIIOBO Nandipha

National Diploma in TEXTILE TECHNOLOGY

BLOSE Siphamandla
MADUNA Sanele Beatrice
MAZIBUKO Nosipho
MKHIZE Ntombi Martha
MOKOENA Nkosinathi
MTHETHWA Witness Nozipho
MVELASE Xolisile Sindiswa

ZULU Zanele

Higher Certificate in SPORT MANAGEMENT SCIENCE

MLAMBO Anele MUNOZ Roberto



CONGRATULATIONS SIYAKUHALALISA