FINAL GRADUATION LIST

GRADAUTION DATE: 07 December 2026
TIME: 09:30

FACULTY OF SCIENCE

DEAN: PROFESSOR N CHETTY BSc Hons (Natal) MS PhD (U. Illinois Urbana-Champaign) MASSAf MSAIP

Doctor of Philosophy

ABUBAKAR, Hadisu Bello *Animal, Plant and Environmental Sciences*
THESIS: Observed and simulated climate of the Enkangala escarpment in South Africa
The thesis explores observed trends and projected changes in rainfall over South Africa's Enkangala escarpment, using quality-controlled weather station data and detailed model projections of future climate change. Spring rainfall has significantly decreased over the last four decades, and further decreases are projected under low mitigation futures. Extreme rainfall events have been increasing, with further increases projected under ongoing global warming. The research findings are relevant to the development of adaptation options for water resource management, agriculture and fire control.
Supervisors: Professor F Engelbrecht and Professor M Scholes

ADAM, Maal Abubaker Abdallah *Geology, Palaeontology and Geophysics*
THESIS: Estimating water storage changes using satellite data in the Western Cape
This research investigated groundwater storage changes in South Africa's Western Cape using GRACE satellite observations and machine learning techniques. A Random Forest downscaling model was developed to improve the spatial resolution of satellite-derived groundwater storage estimates, enabling more detailed monitoring in data-scarce regions. The findings demonstrate the value of integrating remote sensing and machine learning to support sustainable groundwater management, drought assessment, and informed water resource planning under increasing climate variability.
Supervisors: Dr S Enslin and Professor KA Ali

ARONSON, Ruth Shifra *Molecular and Cell Biology*
THESIS: Exploring the biological mechanisms of cholesterol-mediated drug resistance in colorectal cancer using intestinal organoid cultures
This thesis reports the first investigation delineating dysregulated cholesterol homeostasis as a determinant of chemotherapy resistance in South African patient-derived and patient-matched colorectal cancer organoids. Using β-cyclodextrin-mediated cholesterol modulation, this work identified a novel chemo-sensitising strategy for oxaliplatin in a chemotherapy resistant model. The findings of this study provide a foundation for personalised therapeutic strategies.
Supervisor: Professor M Kaur

ARORA, Kabir *Geography, Archaeology and Environmental Studies*
THESIS: Understanding home as a place of work in the lives of waste pickers in Bengaluru
Employing relational comparison and critical ethnography in four Bengaluru settlements—Avalahalli, Kunthigrama, Cement Colony, and Rajarajeshwari Nagar - the thesis conceptualises homemaking among waste pickers as an outcome of interconnected dialectical relationships among economic, political, and intimate processes. The thesis advances theoretical and practical understanding of workers' organising by demonstrating how homemaking practices are connected to the multiscalar notion of home and to the development of waste pickers' worker identities.
Supervisors: Professor M Samson, Dr A Wafer and Professor S Charlton

AYIKWEI, Abigail Enyonam *Geology, Palaeontology and Geophysics*

THESIS: Geophysical constraints on the Volta Basin structure, central Ghana

This thesis integrates aeromagnetic, gravity, seismic, radiometric, electromagnetic, borehole and petrophysical datasets to redefine the structural architecture and tectonic evolution of Ghana's Volta Basin. The study demonstrates that inherited Palaeoproterozoic basement fabrics exerted a major control on basin development through repeated reactivation. It proposes a polyphase tectonic model involving early rifting, thermal subsidence and later compressional to transpressional deformation, while identifying structural controls relevant to mineral, groundwater and hydrocarbon exploration.

Supervisors: Associate Professor S Webb, Dr S Enslin and Professor M Jessell

BEN-DAVID, Ateret Devorah *Molecular and Cell Biology*

THESIS: Exploring tunnel and active site residues in nitrile hydratase to modulate substrate scope through integrated computational and experimental approaches

This research investigated whether modifying nitrile hydratase, an enzyme used in industrial chemical production, could alter the range of substrates it converts. Integrating computational modelling with laboratory experiments, the study revealed how the enzyme's internal tunnels and active site influence substrate accommodation, stability and catalytic performance, informing future enzyme engineering for more sustainable chemical manufacturing.

Supervisors: Associate Professor I Achilonu and Professor D Brady

BHANA, Rohail Hershil *Computational and Applied Mathematics*

THESIS: Clinically-constrained multi-label threshold optimisation for paediatric lung disease prediction in South Africa

This thesis investigates how machine learning and optimisation can support the early screening of paediatric lung disease, using a novel South African paediatric pulmonology dataset. Interpretable machine learning models are benchmarked across multiple respiratory diseases, and threshold selection is then formulated as a clinically constrained optimisation problem, determining disease-specific thresholds that enforce a minimum asthma detection rate. This is extended to an asymmetric-cost framework reflecting the unequal consequences of missed cases and false alarms, supporting more transparent screening decisions.

Supervisors: Dr A Magan and Miss K Prag

BINDA, Sifundo Delton *Physics*

THESIS: Explosive alchemy: Thermonuclear nucleosynthesis in novae and supernovae *Investigating the spectroscopy of ^{39}Ca and ^{48}Cr with implications for the ^{38}K(p, γ)^{39}Ca and ^{44}Ti(α, p)^{47}V reactions*

This thesis provides spectroscopic data important for the ^{38}K(p,gamma) and ^{44}Ti(alpha,p) reactions via high-resolution ^{40}Ca(p,d) and ^{50}Cr(p,t) measurements, respectively. To address calcium-isotope nucleosynthesis in classical novae, the first study resolved conflicting ^{39}Ca resonance properties and evaluated their impact on the reaction rate. Complementing this, the second study provided the first experimental proton-decay branching ratios of ^{48}Cr to benchmark statistical nuclear reaction models vital for interpreting ^{44}Ti yields in core-collapse supernovae.

Supervisors: Associate Professor L Pellegri and Dr L Donaldson

BUTHELEZI, Musawenkosi *Geology, Palaeontology and Geophysics*

THESIS: Integrating multi-source geoscientific data with machine learning for predictive mineral prospectivity modelling in the Northern Cape Province

This thesis demonstrated that mineral prospectivity within the Northern Cape Province is primarily controlled by non-linear geoscientific patterns rather than univariate geochemical trends alone. By integrating geophysical, geochemical, structural, and machine learning datasets, his study established that spatial feature interactions, positive–unlabelled modelling, and ore texture classification exert significant influence on predictive targeting. The research advances data-driven mineral prospectivity modelling and provides a robust framework for optimising brownfield exploration, target prioritisation, and resource evaluation.

Supervisors: Associate Professor G Nwaila, Associate Professor G Bybee and Associate Professor M Manzi

CHABALALA, Vongani Cyril *Physics*
THESIS: Quality assurance of on-detector electronics for ATLAS Phase-II Tile Calorimeter
The publications are based on my PhD research on the quality assurance of the ATLAS Tile Calorimeter Phase-II Low Voltage Power Supply (LVPS) system and the application of artificial intelligence to air quality monitoring. The research contributes to the development of reliable detector electronics for the High-Luminosity Large Hadron Collider (HL-LHC) and demonstrates the use of machine learning and cost-effective technologies to improve environmental monitoring.
Supervisors: Professor B Mellado and Dr M Kumar

DRUDE, Lyriche Charne *Animal, Plant and Environmental Sciences*
THESIS: The beachhead effect in cities of the Global South: a test case with *Ailanthus altissima* (Simaroubaceae)
This thesis addresses gaps in understanding urban plant invasions in the Global South through a case study of *Ailanthus altissima* in the City of Johannesburg, South Africa. It evaluates accessible approaches for detecting and monitoring invasive plants and examines the spatial and temporal dynamics of the invasion, advancing understanding of urban biological invasions and providing evidence to inform their management.
Supervisors: Associate Professor C Reynolds and Professor M Byrne

DUMBE, Abigail Moya Mbozi *Chemistry*
THESIS: Evaluation and risk assessment of legacy OCPs and PCBs in surface water and sediment of selected aquatic systems in Southern Africa: case study of Lake Kariba, Zambia and Crocodile River, South Africa
This study investigated organochlorine pesticides and polychlorinated biphenyls in surface water and sediments from Lake Kariba, Zambia, and the Crocodile River, South Africa. Using optimised extraction methods and GC-μECD, contaminant occurrence and potential sources were examined alongside human health and ecological risks. Findings highlighted varying contamination patterns and potential risks, underscoring the need for continued monitoring and effective pollution management.
Supervisors: Professor L Chimuka, Professor H Richards, Professor H Tutu and Professor L Madikizela

GIBSON, Borbor A.K.K. *Geology, Palaeontology and Geophysics*
THESIS: Development of an innovative processing approach towards the extraction of PGEs from complex oxidised flotation tailings material
The study developed a novel hydrometallurgical flowsheet as an alternative to traditional flotation for extracting platinum group elements and base metals from complex, low-grade oxidised tailings. The research integrated a sequential multistage leaching approach and offered detailed process mineralogy-driven characterisations to establish the laboratory-proven flowsheet for reprocessing complex PGE tailings.
Supervisors: Associate Professor G Nwaila and Professor J Petersen

GINSTER, Carl Friedrich *Mathematics*
THESIS: Nilpotent R-powered groups
This thesis develops an extension theory for nilpotent *R*-powered groups by introducing inner and external semi-N_R-direct products and the additional notion of an *R*-action. It associates each extension with a factor pair (*f*, *g*), defines the cocycle and coboundary groups $Z_R^2(Q, A)$ and $B_R^2(Q, A)$, and proves that $H_R^2(Q, A)$ classifies such extensions up to equivalence.
Supervisors: Dr R Kwashira, Professor JC Mba and Associate Professor Y Hardy

HAILU, Fitsum Addis *Chemistry*
THESIS: $MoNi_4$ based bi-functional electrocatalysts for high performance rechargeable zinc-air batteries and overall water-splitting
Recent energy matrix shows fossil fuels are the main contributor for energy stream. Green and renewable energy must use energy storage devices, like RZABs. Energy can also be stored in another form as H_2 produced using electrolysis. This thesis shows synthesis and application of transition metal-based $MoNi_4$ electrocatalyst for RZABs and $MoNi_4$-MoO_2 for overall water splitting, aiming to solve the green energy generation and supply problems.
Supervisors: Professor K Ozoemena and Dr A Haruna

KADYAMADARE, Grace Alice Rudo *Geography, Archaeology and Environmental Studies*
THESIS: Waste Matters: insights into informal waste disposal practices and spaces in the Drakenstein Municipality
Through a critical ethnography in Mbekweni township, the thesis reconceptualises illegal dumping as informal disposal, a form of socio-spatial political praxis that forces the state to redress racialised service inequities. Contributing to theoretical and policy debates, the study advances more just, participatory, and context-responsive approaches to municipal waste governance.
Supervisors: Professor M Samson and Dr A Wafer

KHANGAMWA, Gift *Computer Science*
THESIS: Learning from incomplete tabular health datasets
This thesis addresses the pervasive challenge of learning from incomplete Tabular Health Datasets, specifically focusing on Demographic Health Survey data from sub-Saharan Africa. Missing data in these contexts is often complex, occurring across various features and labels through diverse missingness mechanisms: MCAR, MAR, and MNAR. We argue that traditional one-step machine learning workflows are insufficient for such datasets. This study proposes a holistic framework that integrates realistic Synthetic Dataset Generation with advanced Missing Data Imputation.
Supervisors: Professor C Van Alten and Associate Professor T Van Zyl

KIGOZI, Flavia Nantege *Animal, Plant and Environmental Sciences*
THESIS: The impact of self-recognition and recognition by others on the development of science and biology identities among undergraduate biology students
This thesis explores how undergraduate biology students in South Africa come to see themselves as scientists, and how recognition from family, peers and educators shapes their sense of belonging. Bringing South African perspectives into science identity research, it shows how students' knowledge, relationships and changing career aspirations intersect as they navigate what it means to belong in science.
Supervisor: Associate Professor S Dukhan

KOENAITE, Mokgaetsi Florence *Geography, Archaeology and Environmental Studies*
THESIS: Contribution and integration of waste reclaimers into Johannesburg's inner city municipal waste management system: cultural theory and systems approaches
This thesis investigates the contribution and integration of waste reclaimers within Johannesburg's inner-city municipal waste management system. Drawing on cultural theory and systems thinking, it reveals how cultural rationalities and systemic governance processes reproduce exclusion despite policy recognition. The study proposes a cultural-systemic framework to support more inclusive, participatory and environmentally just waste governance.
Supervisor: Dr N Kubanza

KRINSKY, Keelan *Molecular and Cell Biology*
THESIS: Identification and structural analysis of cassava mosaic disease resistance (R) genes and associated quantitative trait loci
This research dissects the genetic basis of cassava mosaic disease (CMD) resistance, in conjunction with scientific methodologies and the political ideologies that have shaped over a century of CMD resistance breeding research. A dangerous dependency on a monogenic antagonistic CMD response is critiqued, and an alternative breeding strategy that re-contextualised CMD tolerance as a proto-mutualistic association between cassava and cassava begomoviruses, is proposed.
Supervisors: Professor M Rey and Dr B Sizani

LAVIS, Natasha *Physics*
THESIS: Radio-frequency searches for dark matter with MeerKAT
The enigmatic nature of dark matter is investigated using observations from the MeerKAT radio telescope, treating galaxy clusters as laboratories for indirect dark matter detection. The work delivers new constraints on dark matter properties across ten previously unexamined clusters while testing a novel Bayesian statistical framework for the field and examining key systematic uncertainties in the analysis method. In doing so, it establishes a robust analysis pipeline poised for deployment with next-generation instruments such as the Square Kilometre Array.
Supervisors: Dr G Beck and Dr K Knowles

LEFOTLHA, Wendy Chrisentious Makoma *Computational and Applied Mathematics*
THESIS: A comparative study of statistical event history analysis and the visualisation technique of orbit theory analysis of binary multivariate longitudinal data
Using 1998–2008 Agincourt HDSS data, this PhD thesis compares Event History Analysis (EHA) with Orbit Theory (OT) to study under-five child mortality. While EHA quantifies statistical risk odds, OT provides geometric visual trajectories that uncover unique, high-risk structural patterns EHA misses.
Supervisors: Professor D Sherwell and Dr V Visaya

MACHEBELE, Prudence *Geography, Archaeology and Environmental Studies*
THESIS: Refining the spatial mismatch in South African metropolitan areas: the impact on violent crime and educational attainment
This thesis critically examines spatial mismatch in South African metropolitan areas, exploring how the spatial disjunction between employment and residential locations shapes patterns of violent crime and educational attainment. Through GIS-based spatial analysis and regression modelling, the study demonstrates how persistent spatial inequalities reinforce cycles of poverty and exclusion, advancing evidence-based insights for inclusive spatial and urban policy reform.
Supervisor: Dr G Weir-Smith

MAKOETJE, Malebona Irene *Geography, Archaeology and Environmental Studies*
THESIS: Community-based water resources management and adaptation to climate change: a case study of Maputsoe, Leribe, Lesotho
This study investigated how local communities value, use and manage water resources in Maputsoe, Lesotho, through the lens of environmental justice. Mixed methods were used involving interviews, focus groups and participatory approaches. Results show that climate change, overpopulation and economic growth negatively affect water access and lead to unsustainable water management practices. This requires coordinated actions by government, parastatal groups, and communities.
Supervisor: Professor J Knight

MANAKA, Thokozile Valentine *Computer Science*
THESIS: Multi-step transfer learning in natural language processing in the health domain
The candidate improved verbal autopsy (VA) text representations for cause-of-death classification in low-resource settings. Using embeddings from general English and biomedical domains, the Multi-Step Transfer Learning Framework improved model performance over single-domain baselines. These advances contribute to NLP applications in health for LMICs.
Supervisors: Associate Professor T Van Zyl, Associate Professor A Wade and Professor D Kar

MANDENDE, Hakundwi *Geology, Palaeontology and Geophysics*
THESIS: Petrogenesis and economic potential of the upper differentiates of the upper zone in the Northern Bushveld Complex
This thesis investigates the petrogenesis and economic potential of the upper differentiates of the Upper Zone in the Northern Limb of the Bushveld Complex. It integrates petrography, mineralogy, geochemistry, mineral chemistry and hyperspectral imaging to constrain magmatic evolution, characterise apatite–oxide mineralisation, and evaluate the potential of apatite-rich rocks as unconventional sources of critical and economically significant mineral commodities, including rare earth elements, titanium, phosphorus and iron.
Supervisors: Professor R Latypov and Dr C Hatton

MAVUNDA MBELE, Alter Nyiko *Geography, Archaeology and Environmental Studies*
THESIS: Climate change risks and adaptation options in the Mopani District Municipality of the Limpopo Province, South Africa
The candidate examined climate change risks and adaptation options for rural livelihoods in Mopani District Municipality. Integrating climate science, indigenous and local knowledge and community perspectives, the research developed the Transformative Adaptation Framework, providing an empirical foundation for inclusive governance, strengthened livelihood resilience and sustainable adaptation in vulnerable communities.
Supervisors: Professor F Engelbrecht and Professor C Vogel

MAVUSO, Silindokuhle Siyabonga *Geology, Palaeontology and Geophysics*
THESIS: The sedimentological history of the upper Burgi Member of the Koobi Fora Formation: insights into Early Pleistocene landscape evolution in the Turkana Basin, Kenya
This thesis presents a detailed sedimentological and sequence stratigraphic investigation of the Upper Burgi Member in the Turkana Basin, Kenya. The study reconstructs palaeoenvironmental conditions within a key hominin-bearing succession, demonstrating how tectonic activity, climate variability, and sediment supply influenced fluvio-lacustrine systems, landscape evolution, and the environmental contexts associated with early Homo during the Plio-Pleistocene.
Supervisors: Associate Professor Z Jinnah and Associate Professor Robyn Pickering

MBAZIMA, Setlamorago Jackson *Geography, Archaeology and Environmental Studies*
THESIS: Exposure assessment and cytotoxicity of chalk particles released in public secondary school classrooms in the Johannesburg region
This study investigated exposure to chalk particles among public secondary school teachers in the Johannesburg region. Through exposure assessments, toxicological assays, dosimetry modelling, and economic evaluations, the research demonstrated that exposure to chalk particles, even at concentrations below occupational standards, poses significant health risks. It advocates for transitioning to alternative teaching tools and implementing enhanced indoor air quality protocols.
Supervisors: Associate Professor R Moolla and Associate Professor JS Joseph

MELATO, Lucas Thabang *Physics*
THESIS: Improving performance and optoelectronic properties of photodetector devices using luminescent quantum dots as an electron transport layer
The candidate investigated magnesium and strontium doping of zinc oxide nanoparticles for ultraviolet photodetection. The study examined how dopant concentration and annealing atmosphere influence structural, morphological and optical properties. Selected nanoparticles were incorporated into polyaniline hybrid devices using electrodeposition. Combining both dopants produced the highest reported responsivity, detectivity and efficiency among the devices investigated. These findings provide an experimental basis for optimising material composition and processing conditions to improve the performance of hybrid ultraviolet photodetectors.
Supervisors: Professor O Ntwaeaborwa and Associate Professor D Wamwangi

MKHABELA, Sehlabane Aleck *Geology, Palaeontology and Geophysics*
THESIS: Geological, geochemical and geometallurgical controls on ore variability in the lower F Zone and upper T Zone of the Waterberg Project, Northern Bushveld Complex, South Africa
The thesis has demonstrated that ore variability within the Waterberg Project is primarily controlled by distinct geometallurgical domains rather than grade differences alone. By integrating mineralogical, geochemical, comminution, flotation and glycine–permanganate leaching datasets, the study established that textural complexity, sulphide liberation and mineral deportment exert significant influence on metallurgical performance. The research advances domain-based geometallurgical modelling and provides a robust framework for optimising ore blending, processing strategies and resource value extraction in palladium-dominant PGE deposits.
Supervisors: Associate Professor G Nwaila, Dr M Iudovskaia and Dr M Safari

MKHEHLE, Owabo *Animal, Plant and Environmental Sciences*
THESIS: Gastrointestinal parasites of southern African *Genetta* species (Mammalia: Carnivora): diversity, interspecific and inter-habitat comparisons, and implications for transmission
The study investigated gastrointestinal parasite assemblages and host-parasite associations in free-ranging *Genetta* species in southern Africa. It examined how host identity, phylogenetic relatedness, habitat, seasonality, diet, spatial overlap, and latrine-use behaviour influenced parasite occurrence, diversity, and potential transmission opportunities. The findings provided insights into the ecological and behavioural drivers of parasitism in southern African viverrids.
Supervisors: Dr Z Madikiza, Professor E Do Linh San, Professor CI Muñoz-Garcia and Professor E Rendón-Franco

MOEPYA, Refilwe Jessica *Chemistry*

THESIS: Design and synthesis of arsenic-binding ArsR-derived peptidomimetics for the development of a biosensor for the early detection of arsenic poisoning in South African mines

This research explored ArsR-derived peptides and peptidomimetics as potential recognition elements for detecting arsenic in urine. The compounds were designed, synthesised and evaluated for arsenic binding, revealing the influence of peptide conformation on binding performance. Promising candidates were identified for further development into sensors to support occupational arsenic exposure monitoring in South African mines.

Supervisor: Associate Professor M Makatini

MOHUBA, Seeke Carol *Geology, Palaeontology and Geophysics*

THESIS: The occurrence of radionuclides in historical mining areas of Gauteng Province, South Africa

This thesis provides a multidisciplinary investigation into the occurrence of radionuclides in historical gold mining areas of the Gauteng Province and the possible health risk implications. This study makes valuable geoscientific and environmental radioactivity contributions, with strong potential to influence public policies. Findings affirmed that the ubiquitous tailings dumps are a prominent source of environmental pollution and pose radiological health risks on the surrounding communities.

Supervisor: Professor T Abiye

MOLAENG, Refilwe Emil *Physics*

THESIS: Study of the K quantum number of pygmy states in 154Sm

This study uses polarised photon-beam scattering measurements to investigate the behaviour of the Pygmy Dipole Resonance (PDR) in deformed 154-Samarium nucleus. Spin-parity assignments are performed, and the PDR photoabsorption cross-section is determined. Decay branching ratios are assessed and compared with Alaga rules for the assignment of K quantum numbers. Statistical decay models are used to quantify the expected K = 0, K = 1, and statistical contributions, establishing the extent to which each mechanism contributes to the decay of the PDR states.

Supervisors: Associate Professor L Pellegri, Associate Professor I Usman and Dr L Donaldson

MOLEKWA, Mmasetena Anna *Geology, Palaeontology and Geophysics*

THESIS: A stratigraphic and geochemical study of the limestones from the Lime Acres Member situated in the Neoarchaean dolomite-dominated Campbellrand Subgroup of the Griqualand West Basin, Transvaal Supergroup, South Africa

This study presents an investigation of the Neoarchaean Lime Acres Member, combining stratigraphy, sedimentology, petrography, geochemistry and U–Pb geochronology. It documents metre-scale shallowing-upward cycles, preserved seawater REE+Y signatures, and three dolomite generations linked to marine-influenced, burial and hydrothermal fluids. U–Pb ages distinguish Neoarchaean carbonate formation from Palaeoproterozoic alteration and support a facies-buffered model for selective limestone preservation.

Supervisors: Associate Professor Z Jinnah and Professor R Bolhar

MOODLEY, Saness *Animal, Plant and Environmental Sciences*

THESIS: The importance of pollination ecology in the assembly, trait evolution and species interactions in South African mountain grasslands

The thesis showed how floral traits, pollinator interactions, and environmental conditions influence plant diversity in South African grasslands. The work combined field observations, ecological experiments, and trait-based analyses to examine patterns of community structure, reproductive interactions and species persistence. By linking pollination ecology with broader questions about biodiversity, the study contributes to understanding how plant communities are maintained in heterogeneous landscapes and provides a foundation for future ecological and conservation research.

Supervisor: Professor G Goodman

MUKWEVHO, Nehemiah *Chemistry*

THESIS: Geochemical analysis and source provenance of critical minerals in the sediments: environmental implications and sustainability

This thesis reveals urban river sediments as a pollution sink and an overlooked secondary source of critical minerals. Integrating geochemical, mineralogical and statistical evidence, it separated natural rare earth element, uranium and thorium signatures from human pollution, identified lead, mercury and gadolinium hotspots, and showed lime treatment removes over 98% of dissolved rare earth elements. These findings give a scientific basis for targeted monitoring, river rehabilitation and evaluating contaminated waste streams as potential sources of critical minerals.

Supervisors: Professor L Chimuka, Dr J Tshilongo, Dr R Letsoalo and Dr H Mabowa

MUOFHE, Tshimbiluni Percy *Geography, Archaeology and Environmental Studies*
THESIS: Impacts of Antarctic stratospheric ozone recovery on climate change in the Southern Hemisphere and southern Africa
The thesis explores how stratospheric ozone recovery will affect Southern Hemisphere climate change and rainfall in southern Africa, under different greenhouse gas (GHG) mitigation scenarios. The findings show that ozone recovery can arrest the poleward migration of the westerlies under strong mitigation. However, high GHG emissions counteract ozone recovery, strengthening polar westerlies and increasing regional drying in southern Africa. Low mitigation implies that southern Africa will likely experience systematic rainfall changes, highlighting the need for effective mitigation and adaptation strategies.
Supervisors: Professor F Engelbrecht and Professor T Ndarana

NGOEPE, Nkgaetsi Marius *Chemistry*
THESIS: Electrochemical properties of high-entropy spinel oxides for pseudocapacitors and rechargeable zinc-based batteries
This thesis investigated the electrochemical properties of high-entropy spinel oxides in various energy storage systems, focusing on pseudocapacitors, rechargeable zinc-ion and zinc-air batteries. The study demonstrated the influence of high-entropy spinel oxides structure, morphology and chemistry defects towards electrochemical performance in zinc-ion batteries, zinc-air batteries and pseoducapacitors. The findings indicate that the materials have a potential as cathode electrode in energy storage systems. Furthermore, the study contributes to addressing sustainable energy supply challenges.
Supervisors: Professor K Ozoemena, Dr A Haruna and Dr T Mofokeng

NXUMALO, Dumisani *Physics*
THESIS: N = 1, d = 4 supersymmetric gauge theories: an exploration of quiver representations, Yangian symmetries, and modular forms
This research proposes an isomorphism between two Yangian algebras of N = 1 supersymmetric gauge theories connected through Seiberg duality, thus extending the constructions for the generalised conifold to the canonical bundle over the zeroth Hirzebruch surface $F_0 = P^1 \times P^1$. We also show that automorphic forms describing BPS black hole micro-states can be learned through machine learning techniques.
Supervisor: Professor V Jejjala

PERVEZ, Farheen *Molecular and Cell Biology*
THESIS: A comparative study of the structural, biophysical and biochemical properties of hemoglobin from sheep (*Ovis aries*) and Angora goat (*Capra aegagrus hircus*)
This study provides the first comprehensive comparative analysis of sheep and Angora goat hemoglobin using structural, biophysical, biochemical, crystallographic, and computational approaches. Notably, the first high-resolution crystal structure of sheep oxyhemoglobin was solved and characterised. The findings demonstrate that GSH modulates hemoglobin structure and dynamics, providing novel insights into oxygen transport, redox regulation, and oxidative stress adaptation in ruminants.
Supervisors: Dr R Pandian and Professor Y Sayed

PHURAVHATHU, Dakalo Gerold *Physics*
THESIS: The MeerKAT massive distant clusters survey: diffuse radio emission in galaxy clusters at z > 1
This thesis investigates diffuse radio emission in 30 massive, Sunyaev–Zel'dovich-selected galaxy clusters at z > 1 using the MeerKAT telescope. It identifies radio halos and candidate diffuse sources, measures their spectral and scaling-relation properties, and demonstrates that mergers and turbulent particle re-acceleration remain important in powering synchrotron emission in the distant Universe.
Supervisors: Professor M Hilton and Dr SP Sikhosana

REDDY, Kerry-Leigh Paige *Geography, Archaeology and Environmental Studies*
THESIS: Living heritage: variability in gazettement and safeguarding among South Africa's provinces
This thesis examines how living heritage is recognised and safeguarded across South Africa's provinces. Through an analysis of heritage declarations and governance practices, it identifies uneven provincial recognition, institutional constraints and gaps between formal declaration and safeguarding. The research contributes to understanding how South Africa's heritage management system accommodates living cultural traditions and practices.
Supervisor: Associate Professor T Russell

SAMBO, Recognise *Geography, Archaeology and Environmental Studies*
THESIS: A multi-proxy palaeoecological analysis of Bovidae and Cercopithecoidea fossils from *Australopithecus*-bearing deposits at Sterkfontein Caves, South Africa
This thesis reconstructs the palaeoecology of Sterkfontein Caves, South Africa, during the Pliocene through a multiproxy analysis of fossil bovids and cercopithecoids from Members 2 and 4. Integrating postcranial ecomorphology, stable carbon isotopes, mesowear and hypsodonty, the study reveals heterogeneous mosaic environments, providing insights into habitat diversity and the ecological context of early *Australopithecus*.
Supervisor: Associate Professor D Stratford

SINGH, Sachleen *Physics*
THESIS: Nonlinear structured light: creation, control and detection
In this work, we tailor the amplitude and phase degrees of freedom of structured light using nonlinear optics, developing a nonlinear structured-light platform. We do this with difference-frequency generation, a second-order nonlinear process, where two spatial modes interact inside a nonlinear crystal. This produces high-fidelity spatial modes and enables fast, all-optical nonlinear technique for adaptive optics.
Supervisor: Professor A Forbes

SIRIRAM, Chantel Robin *Statistics and Actuarial Science*
THESIS: Adaptation of global health technology assessment models for application in South Africa using analytics techniques
This research explores how health technologies can be evaluated and funded more fairly in South Africa. The work examines patient-reported outcomes in advanced lung cancer, health technology assessment, and equity in healthcare decision-making, proposing context-sensitive frameworks that balance cost-effectiveness, patient experience, and social justice in resource-constrained healthcare systems.
Supervisor: Professor R Harris

STUART, Brandon Philip *Geology, Palaeontology and Geophysics*
THESIS: Morphological and phylogenetic trends in the Therocephalia (Synapsida: Therapsida)
This thesis explores the anatomical diversity, phylogenetic relationships, and evolutionary trends of Therocephalia. By integrating anatomical descriptions of new fossil material, computed tomography, osteohistology, and the documentation of postcranial variation into expanded phylogenetic datasets, it advances therocephalian taxonomy and promotes the integration of postcranial anatomy into studies of therapsid evolution.
Supervisors: Professor J Botha and Dr A Huttenlocker

TONISI, Thandile *Mathematics*
THESIS: Asymptotic geometric property of the Mislin genus of a nilpotent group
This study explores the asymptotic geometry of the Mislin genus in nilpotent groups, examining how quasi-isometric embeddings and subgroup distortion affect its stability or collapse. The findings provide new insight into the large-scale metric structure of genus group representatives and clarify the geometric conditions underlying rigidity, triviality, and asymptotic behaviour.
Supervisors: Professor J Mba, Dr R Kwashira and Professor E Mphako-Banda

WAMBUGU-KYANDI, Jacqueline Nyambura *Geography, Archaeology and Environmental Studies*
THESIS: The growth and circulation of cash among the informal traders of Johannesburg
The candidate explored the role of cash among Johannesburg's informal traders despite digital advancements. The study demonstrates cash continued centrality, with fintech innovations increasingly bridging the gap for the unbanked. The research offers insights into urban informal economies, contributing to national debates on South Africa's shift towards a cashless economy
Supervisors: Associate Professor M Evans and Dr A Wafer