

FACULTY OF ENGINEERING AND THE BUILT ENVIRONMENT

DEAN: PROFESSOR C MUSINGWINI BSc (Hons)(Eng) (UZ) MSc(Eng) (Wits) PhD (Wits) PrEng FSAIMM

Doctor of Philosophy

ASWAT, Muhammed

Electrical Engineering

THESIS: Agent-Based modelling for constrained electrification systems

The candidate studied the challenges of rural electrification and developed a new approach to model how small power systems and loads interact in rural environments. This work led to an innovative approach and delivered a significant technological improvement in providing affordable electrical refrigeration.

Supervisors: Professor W Cronje and Professor A Van Wyk

BOSALETSI, Ouma Enesia Tlou

Electrical Engineering

THESIS: Managing controllable thermal loads to reduce the rate of change of frequency during system contingencies in low inertia power systems

This research developed a small-scale experimental power grid to study how renewable energy, like solar and wind, affects electricity stability. It showed that everyday appliances such as water heaters can automatically adjust their power use to help keep the grid steady, offering a low-cost, practical way to support renewable-based power systems.

Supervisors: Professor W Cronje and Professor L Masisi

DANGOR, Mohammed Raees Ebrahim

Electrical Engineering

THESIS: A multidimensional approach to measure and analyse online learning poverty

The candidate developed the concept of online learning poverty and introduced the Online Learning Poverty Index to measure resource-related deprivation in online and blended learning. Using survey data from 1,016 Wits University students, the thesis shows that unequal access to digital tools, electricity, and suitable study spaces creates measurable barriers to educational participation.

Supervisors: Professor E Trengove and Dr M Bekker

ESSA, Saadia

Electrical Engineering

THESIS: Personalised learning based on machine learning approaches

This thesis explores how Artificial Intelligence uses students' online learning behaviour to predict their learning preferences and support personalised learning. By developing and testing a hybrid machine learning approach within a South African institution, it contributes to personalised learning approaches that can provide effective, engaging learning experiences for diverse students.

Supervisors: Professor T Celik and Dr N Human-Hendricks

GONDWE, James

School of Architecture and Planning

THESIS: Reimagining More-than-Human Cities in Africa: Exploring animal geographies of cattle in Karonga Town, Malawi

Current literature on livestock-human relations in urban Africa is limited to the premise that livestock are resources for urban development and that livestock rearing is a rural enterprise. By illuminating the empirics of complex human-cattle entanglements with more-than-human geography theories and foregrounding the human-cattle relations with multispecies ethnography, the study revealed that the ing'ombe (cattle) contributed the functionality and form of Karonga Town beyond a commodity framework.

Supervisor: Professor M Sihlongonyane

MATLALA, Boitumelo Veronica

School of Architecture and Planning

THESIS: NGO Mediation In Urban Development. The case of Development Action Group's role in redevelopment of Woodstock and Salt River

This thesis centers the relationship between the local state and civil society actors engaged in urban development. Dr Matlala studied non-governmental organisations working to deepen participatory planning. Focusing on redevelopment proposals in two inner-city Cape Town suburbs, Matlala shows how NGO mediation affected both community actors and the state, structuring the relationship between the two. Her work thus extends the concept of mediation in urban development

Supervisors: Professor S Charlton and Professor C Benit-Gbaffou

MKHIZE, Msizi Collen

Chemical Engineering

THESIS: Viability of Sasol coal and ash as sources of critical raw materials, focusing on rare earth elements (REEs) This research has pioneered the recovery of rare earth elements and critical raw materials from South African coal and coal-derived ashes, demonstrating the transformative potential of unconventional resources for sustainable mineral beneficiation. Through the innovative integration of thermal, hydrothermal, and hydrometallurgical processes, this work advances circular economy development, strategic resource recovery, and future energy and industrial technologies

Supervisors: Professor O Bada and Professor N Wagner

MTHETHWA, Fundiswa

Electrical Engineering

THESIS: Energy management and control paradigm for optimal peer-to-peer energy sharing to increase the resilience of remote interconnected microgrids

The candidate has conducted pioneering research on the management and control of renewable-dominated interconnected microgrids, also referred to as nested microgrids, aimed at delivering reliable and environmentally resilient power to agro-based rural communities. Her work addresses the critical challenge in regions where centralized grid access is either unavailable in remote areas or severely compromised by frequent outages and power quality deficiencies. By integrating advanced control strategies, adaptive load management, and renewable resource optimization, her research ensures both stability and sustainability of local energy systems. Importantly, her methodologies are highly transferable to practical and industrial implementations, offering scalable solutions that could substantially mitigate the long-standing energy reliability issues confronting the country, while promoting socio-economic development and climate-resilient energy infrastructure.

Supervisors: Professor G Gomes and Professor D Dorrell

NELWALANI, Ndivhuwo Brayner

Metallurgy and Materials

THESIS: The effect of casting parameters on mechanical properties of high chromium white cast iron

This research varied carbon and chromium content in high chromium white cast iron (HCWCI) alloys, linking solidification data to metallurgical microstructural development. This enabled optimisation of mechanical properties and corrosion behaviour. Ultimately, a predictive database was created to help engineers select the best alloy for practical applications

Supervisors: Professor M Bodunrin and Dr D Klenam

OWOLABI, Abideen Toba

Civil Engineering

THESIS: Factors affecting the interpretation of piezocone penetration testing

The candidate's research focused on the cone penetration test which is the most widely used method to assess the mechanical stability of mine waste facilities. His work has deepened our understanding of this test and yielded insights essential to preventing catastrophic failures. Such collapses have devastated communities across virtually all mining nations, including South Africa, as tragically illustrated by the disasters at Merriespruit and Jagersfontein.

Supervisors: Dr L Torres Cruz and Dr R Bradley

ZULU, Njabulo Mziwandile

Chemical Engineering

THESIS: Phase equilibrium investigation into mixed carbon dioxide and methane hydrates inhibition by Deep Eutectic Solvents

Exploring cost-effective and environmentally friendly measures to prevent the formation of gas hydrates during transportation of natural gases, a novel technology of gas hydrate inhibition using green solvents known as deep eutectic solvents was investigated. Using both experimental and theoretical approaches, an evidence that the deep eutectic solvents are promising alternative to conventional chemicals was presented

Supervisors: Dr H Hashemi and Professor A Tumba