College of Science, Engineering and Technology
Research Focus Areas for 2023

All supervisors' contact details may be found at:
https://www.unisa.ac.za/sites/corporate/default/Colleges/Science,-Engineering-&-Technology

1. School of Computing

Supervisor	Contact details	Research area
Prof E Kritzinger	Kritze@unisa.ac.za	Information Security Education / Cyber Safety Awareness
Prof H Lotriet	Lotrihh@unisa.ac.za	Socio-technical aspects of the adoption and use of information systems in organizations and society. The adoption and use of IS in organizations, society and developing countries. Design, adoption and use of information systems in relation to the UN priority areas such as: Sustainable development; Peacekeeping; Dealing with natural and other disasters; Migrants and migration; Making education accessible to all; e-Government resistance; Climate change. Adoption and use of technology in ODeL
Prof P Mkhize	mkhizpl@unisa.ac.za	Knowledge management, Strategic Information System
Prof E Mnkandla	mnkane@unisa.ac.za	The world today is overwhelmed with gigabytes of data that are collected and stored in various forms (structured and unstructured). The nature of our real-world problems today is characterised by very complex processes in which mathematical reasoning or traditional modelling are simply inadequate, such complexities are a result of some uncertainties in these processes due to their stochastic nature. Software engineering processes belong to this category of complex processes. The main focus of my research is on ways to improve software quality in software development projects using contemporary technologies or environments such as 4IR, IoT, Big Data, Data Science, Machine Learning, Cloud Computing, etc. Interested students for MSc and PhD, Postdoctoral fellows and other research collaborations should consider projects to improve software quality. Ultimately, when software quality improves; performance of systems improves, business and customers are satisfied, safety and security improve, and there is betterment of the quality of life for humans.
Prof J van Biljon	Vbiljja@unisa.ac.za	**Human-Computer Interaction for Development** (HCI4D), specifically improving usability, user

		experience and visualisation in the digitization of teaching and learning in marginalised communities. **Machine Learning for Development** (ML4D) in terms of using machine learning techniques for investigating problems critical to marginalised communities.
Prof F Bankole	Bankofo@unisa.ac.za	Expert Systems, Telecommunication Systems, Database Systems, Decision Support Systems, Multi-Criteria Decision Analysis. ICT impact
Prof K Padayachee	Padayk@unisa.ac.za	**Option 1**: Insider Threat Management [PhD (Information Systems)/Masters (Computing)/ Masters (Information Technology Management)] An 'insider threat' is an internal threat that uses the authority granted to them to attack an organisation's IT infrastructure (e.g., unauthorised extraction, duplication, or exfiltration of data, tampering with data, deletion of critical assets, etc.) **Option 2**: Computing Education [PhD (Computing Education)/Masters (Computing Education)] Computing Education encompasses the teaching and learning of computing, and the development of new techniques for teaching and assessing it (some pedagogical, some computational).
Prof S Singh	Singhs@unisa.ac.za	digital-government
Prof BL Tait	taitbl@unisa.ac.za	Biometrics, Blockchain, Aspects of security with focus on network security, and measurement and control systems using Arduino and similar technologies
Prof M van der Merwe	Vdmertm@unisa.ac.za	e-Learning, m-Learning, Psycho-physiological aspects of Human Computer Interaction, Open Source movement.
Prof E van der Poel	Evdpoel@unisa.ac.za	Computational Creativity, Machine Learning. Artificial Intelligence, Explainable Artificial Intelligence
Dr H Abdullah	Abdulh@unisa.ac.za	Governance, Risk Management, Compliance and Information Privacy Protection
Dr D Bisschoff	DBischof@unisa.ac.za	Designing Banking Technology for the Aged and Disabled
Ms P Buthelezi	mathimp@unisa.ac.za	Information security management, Information systems in raising awareness, information systems and Indigenous knowledge awareness, user security awareness, information privacy, technology and mobile bullying, Technology and financial management.
Prof B Chimbo	chimbb@unisa.ac.za	**Human Computer Interaction (HCI)**: -User Experience & Interaction -Eye Tracking Technology -Child-Computer Interaction - Design of Technology for Education -HCI4D -ICT4D -Virtual, Augmented and Mixed Reality (xR) -4IR Research

Dr B Chipangura	Chipab@unisa.ac.za	Mobile Centric Access to Information; Cyber security in e-learning/m-learning; Self quantification technologies
Prof A da Veiga	dveiga@unisa.ac.za	Information security culture / cyber security culture / data privacy culture / Protection of personal information
Dr C Dongmo	dongmc@unisa.ac.za	Formal methods, Software Engineering.
Dr PM Gouws	gouwspm@unisa.ac.za	Robotics, programming, 21st century skills development, lifelong learning through MOOCs, robotics education, access to science engagement and education, engaged scholarship, Fourth Industrial Revolution skills and learning
Mr K Halland	Hallakj@unisa.ac.za	Applied Logic and Description Logics
Dr G Howard	Howargr@unisa.ac.za	IT Innovation Digital Transformation IT-Organisational Change Organisational Transformation and IS/IT Fourth Industrial Revolution (4IR) and Organisations Smart Sustainable Cities Green Information Systems (Green IS) Green Information Technology (Green IT) Green Computing ICT for Sustainability (ICT4S) Information Systems (IS) for community engagement (IS4CE)
Dr J Mabila	Mabiljp@unisa.ac.za	Sustainable integration of ICTs for development and application of emerging technologies e.g. in education
Mr P Machaka	machap@unisa.ac.za	Cybersecurity; Data Science; Machine Learning; Information and Communication for Development (ICT4D); Internet of Things (IoT); Big Data; and Cloud Computing.
Dr S Mtsweni	mtswees@unisa.ac.za	Software projects are human oriented in nature. Human beings are the ones who are responsible for ensuring the success of software projects. One element which is essential when working with people are soft issues which were not given attention when it comes to software projects which led to the higher failure rate of software projects. The issues that are of the greater interest are knowledge management, ethics and ethical culture, members well-being, emotional intelligence, ethical climate, social competency
Prof M Mujinga	mujinm@unisa.ac.za	Information Security, Usable Security, Cloud Computing Security
Dr V Mzazi	hornevz@unisa.ac.za	Areas: e-health. Epidemiology research. Primary health care. Public health medicine. Quality assurance and clinical practice guidelines. Community outreach primary health care. M-health. ICT4Health. Preference: I would like to work with students that are interested in projects that have an in-depth

		engagement with the health system, rather than a superficial one.
Mr E Ochola	ocholeo@unisa.ac.za	Routing Protocols in Mobile Wireless Ad Hoc Networks, Ad Hoc Networks Security
Dr M Phahlane	phahlmm@unisa.ac.za	Adoption and use of information systems by organizations and individuals.
Dr C Pilkington	Pilkicl@unisa.ac.za	Computing education, Virtual learning environments
Prof M A Schoeman	Schoema@unisa.ac.za	Computing education, visualization, ODeL, e-learning
Dr S Ssemugabi	ssemus@unisa.ac.za	User experience, e-Learning, e-Skills, e-Service quality, Application of mobile technologies for development.
Prof CJ Van Staden	vstadcj1@unisa.ac.za	User experience, m-learning, e-learning and eModeration
Mrs P le Roux	Lrouxp@unisa.ac.za	e-Learning and e-Assessment in Computing; Emotional User Experience
Dr T Masombuka	masomkt@unisa.ac.za	Software engineering, Agile software development, DevOps,
Mr S Mhlana	mhlans2@unisa.ac.za	ICT and education, e-learning
Ms P Mvelase	mvelap@unisa.ac.za	Emerging technologies, cyber-physical systems/IoT, Data Analytics.
Mr L Nxumalo	nxumals@unisa.ac.za	Knowledge Management, Software development communities of practice
Mrs D Scholtz	scholid@unisa.ac.za	Cyber Safety, Cyber Security, Information Security, Education
Mr E Tabane	tabane@unisa.ac.za	Internet of things(IoT), Web of Things (WoT), Digital skills
Dr L Motsi	motsil@unisa.ac.za	Information Systems, E-health, E-learning
Dr A Thomas	Thomaa@unisa.ac.za	Automated processing of diagrams, diagram specifications, visual syntax specifications
Dr S Vallabhapurapu	vallas@unisa.ac.za	Development of resistive switching computer memory ReRAM devices ,Green Computing, 4IR (4th Industrial Revolution)
Ms R van der Merwe	VDMerwer@unisa.ac.za	Data Science, Citizen Science, Natural Language Processing, Object Oriented Databases
Mrs R Vorster	Rvorster@unisa.ac.za	Green Computing, Sustainable IT, Green Information Systems Information Privacy Culture, Organisational Data Protection Culture, Information Management
Ms D du Plessis	dpleshw@unisa.ac.za	Natural Language Processing
Ms DR Mokwana	mokwadr@unisa.ac.za	4IR, Cyber Physical systems, IoT, Big data, Cloud computing
Mrs M Serote	serotm@unisa.ac.za	E-Learning, m-Learning, ICT and education
Miss TG Moape	moapetg@unisa.ac.za	Computational Linguistics, Natural Language Processing
Mr.KM Dolo	edolokm@unisa.ac.za	Artificial Intelligence in Nanotechnology. Big Data, Machine Learning, Deep Learning, Internet of Things (IoT), Database systems.
Ms ME van Heerden	Vheerme1@unisa.ac.za	E-Learning, m-Learning, Teaching/Learning Programming

Mr M Maloma	Malommc@unisa.ac.za	e-learning Educational technologies Information Systems
Mrs NE Mwim	Mwimen@unisa.ac.za	Cybersecurity Cybersecurity culture E-health

2. Department of Chemical Engineering

Supervisor		Brief description of research focus areas
Prof LL Jewell	jewelll@unisa.ac.za	Fischer Tropsch Catalysis Environmental Catalysis
Prof B Patel	patelb@unisa.ac.za	Process synthesis, design, integration and intensification Sustainable design of biorefineries, energy systems, and chemical processes
Prof T Mokrani	Tmokrani@unisa.ac.za	Nano composite membranes for fuel cell Novel polymeric membranes for fuel cell Membranes for gas separation Membranes for water treatment Heterogeneous catalysis Electrocatalyst Natural gas conversion
Dr R Sigwadi	sigwara@unisa.ac.za	Nanoparticles Nanofibers Nanocomposite membrane for fuel cell application Nanocomposite membrane for iron redox flow battery (grid) application
Dr NH Mthombeni	mthomnh@unisa.ac.za	Water treatment. Adsorption. Nanotechnology Nanotechnology for Water Purification. Biogas processing
Dr TY Leswifi	leswity@unisa.ac.za	Water and wastewater treatment Adsorption technology Nanotechnology for water treatment Biorefineries Hydrogen energy
Prof S Makgato	emakgass@unisa.ac.za	Coal desulphurization Coke quality improvement Coke quality Clean coal technologies Waste to Energy Emissions reduction techniques Industrial boilers optimization
Ms C Mateescu	mateecm@unisa.ac.za	Environment, Air quality, water, WIL
Mrs MP Nkobane	nkobamp@unisa.ac.za	Nananoscience Nanotechnology. Nano metal oxides

Ms A Osman	Osmana@unisa.ac.za	Water Footprinting Water Accounting Sustainability
Ms MCS Moroenyane	Moroemc@unisa.ac.za	Fuel cell technology Water and wastewater treatment
Dr K Mphahlele	emphahk1@unisa.ac.za	Nanoparticles Nanofibers Micro-modeling of crack propagations in fibre reinforced polymers
Dr T Seadira	seadit@unisa.ac.za	Catalysis, Renewable Energy, Catalytic Wastewater Treatment
K Ledwaba	ledwakm@unisa.ac.za	PEM Fuel cell and Microbial Fuel cell Atomic layer deposition for ultrathin film Pt- based electrocatalyst Two-dimensional (2-D) highly complex nanostructures Energy and Hydrogen storage
Mr A Mavukwana	mavukae@unisa.ac.za	Process Synthesis Computational studies Renewable energy
Dr A Mavhungu	mavhuf@unisa.ac.za	Water and wastewater treatment Adsorption Technology Membranes for wastewater treatment
Dr M Moreroa-Monyelo	Emorerms@unisa.ac.za	Application of micro and biotechnology during water treatment Bioinformatics Adsorption Renewable energy Re-use of waste material Industrial wastewater treatment
Dr N Khesa	khesan@unisa.ac.za	ASPEN plus simulation, Exergy analysis, Power to gas, Oxy-combustion carbon capture and sequestration on coal fired power plants, Sorbent enhanced water gas shift (SEWGS) pre-combustion capture on natural gas combined cycle (NGCC) power plants, Heat recovery steam generator HRSG preliminary design and sizing
Dr S Motshekga	motshsm@unisa.ac.za	Water and wastewater treatment Nanotechnology for water treatment Polymer nanocomposites Nanoparticles
Prof B Nkosi	nkosibs@unisa.ac.za	Catalytic Distillation Process Development Synthesis Gas Catalysis Petroleum Refining Catalysis Zeolite Catalysis

3. Department of Civil Engineering

Supervisor		Brief description of research focus areas
Prof F Ilunga	Ilungm@unisa.ac.za	• Hydrology and water resources engineering • Applications of Artificial Intelligence in water Engineering • Applications Multicriteria decision methods in Water • Applications of multicriteria decision methods in Engineering Education • Open distance and e-Learning • Dam engineering • Hydropower engineering • Fuzzy Logic applications in water resources engineering • Stochastic methods for multidisciplinary research • Entropy applications in Hydrology and water resources • Remote sensing and cloud computing applications in water resource management
Prof B Ikotun	Ikotubd@unisa.ac.za	• Concrete Optimization • Research into using industrial, agricultural and household wastes as supplementary cementitious materials/construction materials. • Cement hydration optimization • Nanotechnology and concrete • Sustainable green concrete researchGeopolymerisation in concrete • Research on mortar materials for 3D printing • Concrete Durability
Dr Walied Hussein Elsaigh	hussiwam@unisa.ac.za	Concrete Pavements, Concrete pavement modelling, Concrete materials, Accelerated Pavement testing, Pavement materials, Beneficial reuse of waste materials in construction.
Prof E Onyari-Benecha	onyarek@unisa.ac.za	Water resources engineering Computational hydraulics Contaminant transport Flood hydrology Water quality modelling
Mr B Verhoek	verhob@unisa.ac.za	Pavement design and materials. Asphalt performance modelling.
Mr A Zimbili	zimbiao@unisa.ac.za	Structural Engineering Design Construction and Building Design Marine structures and oceanography Sustainable development by reusing wastes in concrete
Mr Mohale LM	mohallm@unisa.ac.za	Waste and Asphalt/Construction materials Construction/Project Management

		Occupational, Health and Safety
Ms MA Rikhotso	rikhoma@unisa.ac.za	Concrete made from waste

4. Department of Mining Engineering

Supervisor		Brief description of research focus areas
Prof F Mulenga	Mulenfk@unisa.ac.za	Mine-to-mill Optimisation Rock drilling and blasting Mine design and planning Engineering simulation
Mr P Dikgwatlhe	dikgwim@unisa.ac.za	Mineral Economics Mining Engineering Mineral Resource Management Engineering Management
Prof A Mulaba	mulaba@unisa.ac.za	Technology Development for Mineral Beneficiation Energy in the Mineral Industry Water and Wasterwater in the Mineral Industry Natural Resources Management and Beneficiation
Prof E Fosso Kankeu	fossoe@unisa.ac.za	Leaching and bioleaching Tailings dumps and the environment Water pollution monitoring Wastewater treatment
Dr C Bhondayi	bhondc@unisa.ac.za	Froth flotation Optimisation of the recovery across the froth phase Coarse and fine particle flotation and flotation kinetics Pulp-froth interface phenomena Comminution
Dr N Chimwani	chimwn1@unisa.ac.za	Mine-to-mill optimisation Mineral processing
Ms NM Chiloane	chilonm@unisa.ac.za	Optimization of mine productivity Rock engineering Surface mine fleet performance Low fume drilling and blasting
Ms VC Netshilaphala	netshvc@unisa.ac.za	Rock mechanics Tunnelling Excavation stability
Mr T Chauke	chaukt1@unisa.ac.za	Geostatistics Geometallurgy Geomodelling Geospatial engineering Machine learning application in mining

5. Department of Electrical Engineering

Supervisor		Brief description of research focus areas

Prof Z Wang	wangz@unisa.ac.za	Artificial Intelligence: Neural network, Particle Swarm Optimization, Ant colony optimization algorithms, Genetic Algorithms, Energy (power system) Optimization, and Evolutionary Multi-Objective Optimization; Intelligent Control: Optimal Control, Fuzzy and/or Neural Network Control, Fault Diagnosis and Fault Tolerant Control; Encryption, Complex networks, etc.
Prof P Umenne	umennpo@unisa.ac.za	Telecommunications, Micro-Electronics, Network modelling, simulation, network protocols, OPNET. Femtosecond laser fabrication Josephson Junctions
Mr WP Nel	Wnel@unisa.ac.za	• Engineering Management • Management of Technology • The adoption and diffusion of innovation
Prof M Sumbwanyambe	sumbwm@unisa.ac.za	• MANETs • Wireless technologies. • Short range wireless communication and wireless sensors for the control for renewable energy and energy efficiency purposes. • Pricing and resource management in radio access technologies. • Energy efficiency and renewables. • ICT usage in e-health, e-commerce, e-education and e-governance. • Telecommunication technologies and game theory • Network optimization. • Information technology and their use in social and economic development. Engineering management. • Bio-mimicry and innovation in ICTs. • Artificial intelligence and risk management
Prof A Yusuff	yusufaa@unisa.ac.za	• Signal decomposition, and segmentation, Feature extraction and selection, and pattern classification. • Fault diagnosis and prognosis of electrical devices and components. • Application of Computational Intelligence and Evolutionary schemes in power system: Neural Network and Fuzzy Logical, Particle Swarm Optimisation, Genetic Algorithm. • Online parameter characterisation and optimisation of networks • Aggregation and Integration of electric power generation devices based on renewable energy sources to electric power system.

6. Department of Chemistry

Supervisor		**Research focus areas**
Dr ME Aphane	Aphanme@unisa.ac.za	Physical Chemistry:

		• Extraction of elements from South African Coal Fly Ash. • Utilization of Coal Fly Ash for beneficiations. • Synthesis and applications of Silica nanoparticles and Alumina nanoparticles derived from coal fly ash.
Prof H Clayton	Clayths@unisa.ac.za	Inorganic Chemistry: • Organometallic Chemistry • Structural Chemistry Computational Chemistry
Dr BS Dladla	dladlbs@unisa.ac.za	Physical Chemistry: Molecular interactions in pure and fluid mixtures
Prof S Dube	dubes@unisa.ac.za	Analytical Chemistry: • Target and non-targeted emerging contaminant analysis in aquatic environment • Fabrication of nanomaterials from natural blends for applications including environmental, sample preparation and health • Development of miniaturized and microextraction sample preparation techniques in response to green analytical chemistry • Food safety in food of animal origin • Development of GCxGC HRT and LC-MSMS methods for various applications
Dr N Magwa	magwanp@unisa.ac.za	Inorganic Chemistry: • Hydrometallurgy • Organic-inorganic hybrid crystalline porous materials for water purification • Molecular Modeling
Dr. ED Moema	moemaed@unisa.ac.za	Analytical Chemistry: • Development of environmentally sustainable sample preparation methods for the determination of pollutants in complex matrices • Food safety
Dr N Mketo	mketon@unisa.ac.za	Analytical Chemistry: • Development of greener microwave and micro-extraction sample preparation methods for pre-concentration and adsorptive removal of inorganic and organic pollutants in various matrices (water, food, petrochemicals, coal, soil, sediments, etc.). • Synthesis and characterization of nanomaterials generated from agricultural waste for recovery of PGMs and REEs in industrial and electrical waste.
Prof T Motaung	motaute1@unisa.ac.za	Physical Chemistry: • Synthesis and characterization of physical and viscoelastic properties of polymer blends, composites, nanocomposites for smart material development. Also interested in organic polymer wastes streams and possible treatments for practical applications.

		• Industrially driven projects for closing the gap between industries and higher learning education.
Prof MJ Mphahlele	Mphahmj@unisa.ac.za	Bioorganic Chemistry: • The main thrust of my current research is directed towards the design and synthesis of biologically relevant heteroatom-containing organic compounds as potential multifunctional drugs against biochemical and biological targets associated with type 2 diabetes mellitus (T2DM) • Spectroscopic (NMR, IR, UV-Vis, Raman & HR-MS), single crystal X-ray diffraction (SC-XRD) and computational methods are applied to structural problems.
Dr M Smith	Smithm2@unisa.ac.za	Physical and Structural Chemistry: • Crystallography • Crystal and Co-Crystal Engineering of active pharmaceutical ingredients • Metal-organic crystals of active pharmaceutical ingredients • Pharmaceutical Drug Design
Mr KG Lesenyeho	lesenlg@unisa.ac.za	Analytical and synthetic chemistry • Synthesis of various antioxidant derivatives • Development of GC-MS methods for BD oxidation
Dr RC Chokwe	chokwrc@unisa.ac.za	Analytical and medicinal chemistry • Development of analytical methods to enable quality control of medicinal products in the market. • Indigenous knowledge systems
Mr KC Tapala	tapalkc@unisa.ac.za	Inorganic Chemistry: • Organometallic Chemistry • Classical Coordination Chemistry • Structural Chemistry • Computational Chemistry

7. Department of Mathematical Sciences

Supervisor		Research focus area
Prof EF Doungmo Goufo	dgoufef@unisa.ac.za	Epidemiology
Prof T Dube	Dubeta@unisa.ac.za	Categorical Algebra and Topology, Pointfree Topology
Dr P Ghosh	ghoshpp@unisa.ac.za	Topology, Algebra, Pointfree Topology, Category Theory
Prof O Ighedo	Ighedo@unisa.ac.za	Pointfree Topology
Prof H Jafari	jafarh@unisa.ac.za	Fractional Differential Equations
Prof SJ Johnston	johnssj@unisa.ac.za	Special functions & Orthogonal Polynomials
Prof A Kubeka	Kubekas@unisa.ac.za	Cosmology
Dr J Manale	Manaljm@unisa.ac.za	Differential Equations, Symmetry Analysis, Lie Algebra
Dr M Moremedi	Moremgm@unisa.ac.za	Fluid Dynamics

Dr Z Mpono	Mponoze@unisa.ac.za	Group Theory
Prof J Munganga	Mungajmw@unisa.ac.za	Fluid Dynamics, Epidemiology
Prof I Naidoo	naidoi@unisa.ac.za	Pointfree Topology
Prof M Khumalo	khumam@unisa.ac.za	Numerical Analysis, Integral Equations, Fractional Differential Equations, Generalized Contractions
Prof T Nazir	talatn@unisa.ac.za	Iterated Function Systems, Partial Metric Spaces
Dr BP Ntsime	ntsimbp@unisa.ac.za	Symmetry Analysis, Differential Equations
Prof A Adem	ademar@unisa.ac.za	Differential Equations, Lie Symmetries

8. Department of Physics

Supervisor		Research focus area
Prof M Braun	Braunm@unisa.ac.za	**Theoretical Atomic and Molecular Physics:** Computational Physics focusing on the method of finite elements in its applications to molecular physics. Interest in inverse scattering, especially for its application to geophysical prospecting.
Prof ML Lekala	Lekalml@unisa.ac.za	**Theoretical Nuclear and Particle Physics**: Theoretical study of the properties of few-particle systems. This include studies of structure of and reactions involving these systems at Particle, Nuclear, Atomic and Molecular level. We employ the Faddeev and Faddeev-Yakubovsky formalisms for rigorous benchmark calculations using High Performance computing. Inverse scattering theory and its applications in few-body physics. Applications of few-body methods to study exotic systems such as hypernuclei and superheavy elements. Computational Physics, where we develop efficient numerical methods to solve the aforementioned systems.
Prof GJ Rampho	ramphjg@unisa.ac.za	**Theoretical Nuclear and Particle Physics:** Theoretical studies of properties of exotic nuclei and ultra-cold gasses. Structural and reaction properties of as well as interaction models in halonuclei, hypernuclei and Bose-Einstein condensation. Mathematical Physics focusing on constructing analytical solutions of quantum mechanical equations and numerical solutions of integrodifferential equations for few-body and many-body systems.
Prof AE Botha	Bothaae@unisa.ac.za	**Theoretical Condensed Matter Physics:** Computational Physics, focusing on nonlinear dynamic models of various physical systems, involving the study of chaotic behavior, parametric resonance and various synchronization effects. Specific areas of active research: Monte Carlo Modelling of Spin Systems, Chaos theory and the 'close to the edge' phenomenon and Systems of Josephson junctions and related models.

Prof MS Dhlamini	dhlamms@unisa.ac.za	**Experimental Condensed Matter Physics:** Development and engineering of new improved materials for applications in energy and health sectors to address global warming and finding cure/treatment to life threatening diseases. Synthesizing and characterizing new inorganic host materials containing lanthanide ions and metal ions to explore their viability as new photonic materials. Develop long persistent phosphors, up-converting phosphors and soli-state supercapacitors with long cyclability.
Prof VS Vallabhapurapu	Vallavs@unisa.ac.za	**Experimental Condensed Matter Physics:** Superconductivity, Novel Magnetism, Electron Spin Resonance, Low field microwave absorption, Nanotechnology for water purification and Enzyme based catalysis, Conductivity in polymer and bio-polymer nano composites and Resistive Switching phenomenon. Applied physics and devices such as Josephson Junctions at nano scale, Microwave Spintronics and ReRAM for emerging computer memory devices and Green computing.
Prof SC Ray	raysc@unisa.ac.za	**Experimental Condensed Matter Physics:** Experimental soft matter Physics. Synthesis and characterization of 0-D materials like carbon nano-balls, 1-D materials (Carbon nanotubes), 2-D materials (Graphene and graphene nanoflakes) and 3-D materials (Amorphous carbon, Graphite and diamond-like carbon). I study these materials for electronic and magnetic properties for future spintronic applications.
Prof BM Mothudi	mothubm@unisa.ac.za	**Experimental Condensed Matter Physics:** Development of nanostructured materials used to enhance the properties of long persistent phosphors, solar cells and selective solar absorbers. Use various synthesize methods such as green synthesis, combustion, solid state reaction and sol-gel. Fabrication of multilayer thin-film solar absorbers suitable for concentrating solar power (CSP) plants and nanostructured graphene hybrid solar cells. Optical, electrical and structural properties of nanostructured materials.
Prof SJ Moloi	moloisj@unisa.ac.za	**Experimental Condensed Matter Physics:** Develop devices with improved properties for various applications. Preparation and characterization of the materials prior the device fabrication to investigate a change in structural, magnetic, optical and electrical properties.
Dr B Mukeru	mukerb1@unisa.ac.za	**Theoretical Nuclear and Particle Physics:** Study structure and reactions of halo nuclei and loosely bound nuclei with application in medicine, biology and security. Use High Performance Computing (HPC)

		and Linux clusters for theoretical investigation of these systems.
Dr MM Tibane	tibanmm@unisa.ac.za	**Theoretical Condensed Matter Physics:** Development of allows by computational modelling and simulation of transition metals and graphene-based materials. Density functional theory to predict the alloy stability based on the structural, electronic, magnetic, thermodynamic and mechanical properties.
Dr PS Mbule	mbuleps1@unisa.ac.za	**Experimental Condensed Matter Physics**: Nanomaterials for renewable energy and I specialize in the synthesis and characterization of these materials for the application in organic solar cells, Dye sensitized solar cells and perovskite solar cells. Fabrication of transparent conductive oxides (TCOs) thin films via wet chemistry and surface technologies involving a variety of physical vapor deposition methods.
Dr LL Noto	notoll@unisa.ac.za	**Experimental Condensed Matter Physics**: Develop novel materials and enhancing their properties to suit applications in persistent luminescence and solar cells. Synthesis and characterisation of materials with applications in sun re-chargeable light bulbs and solar cells.
Dr MJ Sithole	sithomj@unisa.ac.za	**Experimental Condensed Matter Physics:** Preparation and studies of physical and chemical properties of zinc compounds such as zinc layered hydroxide salts (ZLHS) for photonic and gas sensing applications. Use low cost methods such as template-less and surfactant-free aqueous chemical growth (ACG) to synthesize zinc compounds.
Prof J Kriek	Kriekj@unisa.ac.za	Use of technology in the teaching and learning of physics; conceptual understanding of physics concepts; effective use of simulations in physics

9. Department of Statistics

Supervisor		Research interest / field of expertise
Prof LK Debusho	debuslk@unisa.ac.za	Spatial and Spati-temporal Modelling Modelling of Environmental Data Generalized Linear Mixed Models
Dr G Kabera	kaberg@unisa.ac.za	Optimal Experimental Designs Survival Analysis Analytic Hierarchy Process
K Malandala	malank@unisa.ac.za	Stochastic Volatility models Measures of risk and machine learning.
Ms MA Managa	managma@unisa.ac.za	Biostatistics Demography
Mr TP Mohlala	mohlatp@unisa.ac.za	Reliability theory; Point and Poisson Processes; Maintenance theory; Stochastic process in finance

Ms S Muchengetwa	Muches@unisa.ac.za	Multivariate analysis i.e. logistic regression, factor analysis, cluster analysis, correspondence analysis, MANOVA, multiple regression, discriminant analysis , log linear analysis , missing value analysis, sampling techniques, distribution theory
Prof P Ndlovu	ndlovp@unisa.ac.za	Construction of optimal designs for nonlinear estimation and quantile regression Time series
Prof PM Njuho	njuhopm@unisa.ac.za	Application of meta-analysis to agricultural studies Scientific data management strategies and software use Linear mixed models Design of small and large-scale surveys studies Epidemiology and health related studies Design of experiments for replicated and non-replicated trials Biometrical approaches to agricultural-based (on-station and on-farm) experiments Statistical analysis of gender related studies
Prof JO Olaomi	olaomjo@unisa.ac.za	Operations Research Patient Flow problems (Queuing theory) Scheduling / Network problems (Shortest route, CPM, PERT) Mathematical programming - Linear, Integer and Dynamic Time Series Econometrics Endogeneity problems Outliers investigations in Time Series Data or in Structural Equation problems Modelling of economic variables Causality Problems Modelling structural equation problems Estimations in the presence of Least Squares violations Canonical Correlations Time series modelling
Prof E Ranganai	rangae@unisa.ac.za	Quantile Regression: Theory and applications Robust Regression and Regression diagnostics Time series: Time domain and frequency domain techniques, Long Memory including GARCH and FIGARCH TYPE Models. These would include applications in renewable energy, precious metals etc
Prof E Rapoo	Rapooe@unisa.ac.za	Stochastic Processes Stochastic epidemiology

10. Institute for Nanotechnology and Water Sustainability (iNanoWS)

Supervisor		Research Focus Area
Prof AT Kuvarega	kuvarat@unisa.ac.za	His research interests are in the areas of advanced oxidation processes and nanostructured catalytic membranes for energy and environmental applications, specifically degradation of organics and inactivation of microbes in water by utilising renewable solar energy. He also has interests in the design of water treatment technologies that utilise solar energy to produce point of use water from wastewater.
Prof MJ Moloto	molotmj@unisa.ac.za	His research is based on the design and functions of nanomaterials from polymer nanofibres, quantum dots and metal nanoparticles. These are explored for their applications on water treatment and biomedical areas.
Dr ME Managa	managme@unisa.ac.za	Her research interest lies in porphyrinoids conjugated to nanostructured materials for Photodynamic antimicrobial chemotherapy (PACT) application. Acquiring pure water free of contaminants (pollutants) and pathogens is a matter of concern which calls for new, effective, and low-cost water disinfection techniques. Photodynamic antimicrobial chemotherapy (PACT) represents a potential, alternative for the inactivation of microbial cells and has already shown to be effective.
Prof L-A de Kock	dkockla@unisa.ac.za	Her research interests are in the development of hybrid materials with supported nanoparticles and their application in wastewater remediation, resource recovery and potential antimicrobial activity at both laboratory and pilot scale.
Prof U Feleni	felenu@unisa.ac.za	Her research specialisation is on electrochemically tuneable nanocomposite chalcogenide materials and their applications in the development of electroanalytical bio/sensors for biomedical and environmental analyses.
Dr J Madito	maditmj@unisa.ac.za	His research interests are in the synthesis, modification, and characterization of nanomaterials for science innovation and technology. His current focus is on the development and integration of high-power energy storage devices for sustainable water and renewable energy management.
Dr NW Hlongwa	hlongnw@unisa.ac.za	His research interest is on developing a nanoelectrochemical sensor for monitoring water, as well as materials for energy storage devices. Part of his research involves finding an economical way to desalinate water.
Dr KE Sekhosana	sekhoke@unisa.ac.za	His research interests include electrochemical sensing, with the main focus being the development of extensive pi-electron conjugated systems based on sandwich-type lanthanide phthalocyaninato

		complexes incorporated into other nanomaterials for advanced electrocatalysis of water pollutants.
Dr X Fuku	fukuxg@unisa.ac.za	His research interests are in electrochemical energy conversion and storage, catalysis, nanotechnology, and green economy. His research focuses on the development of electrochemical devices for off-grid photocatalytic water and wastewater treatment, the detection of toxins and organic pollutants in water, and the conversion of wastewater to bioenergy using microorganisms. The research also focuses on the development of enhanced electrocatalysts and bioinspired co-catalysts for the electrochemical conversion of water and CO_2 into sustainable green hydrogen and other useful chemicals for agricultural and energy applications.
Dr MM Motsa	motsamm@unisa.ac.za	His research interests are in the development and application of membrane technology for contaminated water treatment. The main focus is on the engineering of new generation membranes with improved performance. As well as the preparation of sustainable and energy efficient integrated systems for water reclamation from heavily impaired water sources such as municipal wastewater and seawater.
Dr NN Gumbi	gumbinn@unisa.ac.za	Her research interests are on the development of polymeric membranes, with particular emphasis on tailoring membrane structure-property relations for applications in wastewater treatment.
Prof EN Nxumalo	nxumaen@unisa.ac.za	His research focuses on novel nanostructured membranes, mainly their fabrication, analysis, advanced characterization and application in various fields such as water treatment, energy, seawater desalination and ultra- and nano-filtration. His work further entails the synthesis and advanced characterization of heteroatomic nanomaterials, engineered nanoparticles and nanofibers for diverse applications such as photo- and catalytic applications for use in membrane processes and membrane systems.
Prof RM Moutloali	moutlrm@unisa.ac.za	His research interest are on the design and synthesis of polymers for the fabrication of filtration membranes for water treatment. Of particular importance is the process scale-up, optimization, demonstration, and integration with other treatment technologies such as adsorption and advanced oxidation processes.
Prof BB Mamba	mambabb@unisa.ac.za	His general research interests involve developing advanced technologies for water treatment, which include nanotechnology and membrane technology. The main interest is the removal of organic micro pollutants in water and improving the efficiency of conventional technologies in dealing with new emerging pollutants through integrating existing technologies with nanotechnology to create

		sustainable solutions for maintain and preserving water resources.
Prof TAM Msagati	msagatam@unisa.ac.za	His research interests line in (i) The development of analytical tools for the analysis of environmental contaminants, (ii) research on food supplements, food composition and food/pharmaceutical packaging, (iii) aquatic toxicology, (iv) marine and environmental toxicology, and (v) remediation of contaminated aquatic environments using membrane filters and different types of filters.
Prof TTI Nkambule	nkambtt@unisa.ac.za	His research interests are in the Urban Water Cycle, Conventional, Advanced and Integrated Water Treatment Technologies, Natural Organic Matter in Engineered Water Treatment Systems and Nanotechnology for Water Treatment. His research focus is specifically on Natural Organic Matter (NOM) in South African waters, studying its characterization, treatability and method development for effective NOM removal from water.
Prof H Nyoni	nyonih@unisa.ac.za	Development of sampling techniques and analytical methods (e.g. ICP; chromatography and mass spectrometry etc.) for assessment of priority and emerging inorganic and organic contaminants in aquatic environment, monitoring programs and interlaboratory exercises with a special focus on passive sampling techniques in the aquatic environment.
Dr TJ Malefetse	maleftj@unisa.ac.za	His research interests include (i) Wastewater-based Epidemiology (WBE for public health monitoring), (ii) Circular Economy of Urban Water and Wastewater Research Platform which covers microbial biotechnology for water treatment and nutrient recovery and sludge research which focusses on sludge characterization and investigation of costs resulting from sludge transport and treatment.
Prof LM Madikizela	madiklm@unisa.ac.za	His research interests lie in environmental monitoring, analytical method development, sample preparation, plant uptake of water pollutants and adsorption studies.
Dr TL Botha	bothatl@unisa.ac.za	Her research focus area is in Aquatic Health with a specialization in nanoecotoxicology.
Ms NM Magwaza	magwan@unisa.ac.za	Her research interest is in microbial contamination in the aquatic environment.
Prof H Atagana	atagahi@unisa.ac.za	My research interest is in Environmental Biotechnology with focus on bioremediation of contaminated soil and water. Emphasis is on microbial degradation of recalcitrant organic pollutants of petroleum or similar origins, and phytoremediation of soil and water contaminated with organic compounds and heavy metals.
Prof MM Nindi	nindimm@unisa.ac.za	My research is aligned to Environmental and Analytical research thematic area. It focuses on

		emerging contaminates in aquatic environment, food safety involving green sample preparation and fabrication of nanomaterials using biopolymers for remediation of metals and organic contaminates in aquatic environment.
Dr G. Mamba	mambag@unisa.ac.za	1) Advanced oxidation processes for water and wastewater treatment and disinfection: ❖ Ozonation/photocatalytic ozonation ❖ UV/persulfate/catalytic oxidation ❖ Fenton/photo-Fenton ❖ Sonocatalysis ❖ Piezocatalysis 2) Water and wastewater sludge beneficiation 3) Self-cleaning surfaces (coatings)
Dr. N. Palaniyandy	palann@unisa.ac.za	My research activities are in the fields of "Energy" and "Design & Manufacturing." My focuses in the field of "Energy" are experimental studies of Portable devices, and transport phenomena in micro- and nano-structures energy materials for system design & integration. My current research focus is on, Lithium-, Sodium-, Zinc-ion batteries, Lithium- and Aluminum-air batteries, and Supercapacitors. Various cathode, anode, and electrolyte materials and different synthesis techniques, such as $LiMn_2O_4$, $LiMn_{1.5}Ni_{0.5}O_4$, V-based, and LiFePO4 cathode, Sn-based oxides, and alloys, Mn-based oxides anode, and Ceramic composite electrolyte materials.

11. Department of Mechanical and Industrial Engineering

Supervisor		Research Focus Area
Prof V Vasudeva Rao	vasudvr@unisa.ac.za	• Nano-thermal-fluids • Thermo-physical and mechanical property studies • Friction-stir welding (material and heat transfer) • Material characterisation using Nano-indentation • Thermal contact resistance/conductance • Electrical contact resistance • Contact mechanics • Cooling of electronics using jet impingement • Heat pipes • Non-conventional energy systems
Prof C Enweremadu	enwercc@unisa.ac.za	• Alternative fuels (biodiesel, biogas, bioethanol) • Solar energy (solar radiation, solar PV soiling mitigation) • Thermal storage
Dr L Mthembu	mthemls@unisa.ac.za	• Finite Element Model Updating and Computational Intelligence • Data-mining, • Artificial intelligence

Prof N Ndou	nndou@unisa.ac.za	• Laser Cladding and Additive Manufacturing Process • The study of parametric, laser beam power, laser scanning speed, calibration of mass flow rate, and powder particle size distribution. • The material characterization of wear testing, indentation testing, electron microscopy, and optical microscopy • Lean Manufacturing • Productivity Improvement • Supply chain Management / Logistic • System Dynamics
Prof K Ramdass	ramdakr@unisa.ac.za	• Lean six sigma • Value engineering • Systems engineering • Work study • Ergonomics and workplace dynamics • Engineering education • Quality management • Statistical Process Control • Supply Chain Management
Dr T Sithebe	Sithet@unisa.ac.za	• Analysis of a rapid manufactured / 3D printed products for use in medical use, such oral care.
Prof RW Maladzhi	maladrw@unisa.ac.za	• Development of adoption of 4IR technologies framework within Small Medium Enterprises and other sectors • Smart manufacturing • Lean manufacturing • Technology adoption within engineering education • Maintenance practices • System dynamics applications • Green Entrepreneurship and innovation culture
Dr HM Ngwangwa	ngwanhm@unisa.ac.za	• Infrastructure and structural health monitoring • Structural damage detection using operational response changes • Biomechanics of musculoskeletal soft tissue • Design and development of biomimetic systems
Dr M Pita	pitam@unisa.ac.za	• Material Processes & Thermal Sciences
Dr F Masubelele	masubft@unisa.ac.za	• Maintenance practices
Mr TT Lekwana	lekwamtl@unisa.ac.za	• Hydrodynamic instabilities • Computational Hemodynamics • Atherogenesis • Fluid-Structure-Interactions • Aeroacoustics

12. Research Projects in Science Engineering and Technology areas

Supervisor		Brief description of research focus area
Prof EE Ebenso	ebensee@unisa.ac.za	Physical Chemistry with emphasis on Corrosion inhibition studies and Electrochemistry
Prof T Matambo	matamts@unisa.ac.za	Bio-Technology, Bio-Prospecting, Bio- Gas, Wetlands
Prof X Liu	liux@unisa.ac.za	Fischer Tropsch synthesis, clean fuel production, CO2 capture and utilization, energy storage materials, photocatalysis, electrocatalysis, machine learning for materials design.
Dr M Moyo	moyom1@unisa.ac.za	Fischer Tropsch, Hydrogenation, oligomerization
Prof Y Yao	yaoy@unisa.ac.za	Fischer Tropsch, Desulphurization of Diesel, CO2 utilization, Solid Oxide Fuel Cell
Dr J Gorimbo	gorimj@unisa.ac.za	Fischer Tropsch Synthesis, heterogenous catalysis, waste to energy, biofuels
Prof C Sempuga	sempubc@unisa.ac.za	Process synthesis, gasification, biogas, waste to energy, energy conversion.
Dr J Fox	foxj@unisa.ac.za	Process synthesis, Gasification, Process Design, Energy Systems engineering
Dr C Bhondayi	bhondc@unisa.ac.za	Froth Flotation; Optimization of the recovery across the froth phase; coarse and find particle flotation and flotation kinetics; pup-froth interface phenomena; comminution
Dr N Chimwani	chimwn1@unisa.ac.za	Comminution, Energy minimization in minerals processing circuits,
Dr G Ijoma	ijomagn@unisa.ac.za	Environmental Engineering, Bio-Technology, Bio-Prospecting, Bio-catalysis, Bio- Gas, Bio-diesel, Wastewater (Mine Influence Water) treatment using customized biological systems

13. Astronomy

Supervisor		Brief description of research focus area
Dr Z Mguda	mgudazm@unisa.ac.za	Astronomy and astronomy applications
Dr A Prozesky	prozea@unisa.ac.za	Astronomy and astronomy applications

14. Science Education

Contact person for all Science Education degrees: Prof J Kriek kriekj@unisa.ac.za