Geotechnical and Transport Engineering Research Topics 2025

Supervisor(s)	Degree	Research area or preliminary title of research project	Brief description of project	Scholarship per year
Dr Elaine Goosen	MEng(S) / MEng(R) / PhD	Waste materials in asphalt and/or other pavement materials	Analysing the South African waste landscape and identifying products that are currently not widely recycled that may be considered as constituents in pavement materials, including sustainable replacements/extenders for bitumen. Materials compatibility and performance must be considered, as well as the potential of the material for rural applications and to further economic growth.	Speak to lecturer for funding options
Dr Elaine Goosen	MEng(S) / MEng(R) / PhD	Life cycle considerations of alternative materials in pavement enginering	Many reclaimed and recycled materials have been introduced into pavement engineering materials in recent years. The goal of this project will be to select prevalent pavement materials and alternatives and compare the long-term contributions to carbon emission reductions.	Speak to lecturer for funding options
Dr Elaine Goosen	MEng(S) / MEng(R) / PhD	Machine learning applications in pavement engineering	Machine learning (ML) is becoming a common analytical tool for engineers. This research project will investigate additional insights ML can offer regarding pavement material behaviour and engineering. Examples include, but are not limited to, road condition indices form satellite images, correlations in material properties and behaviour, analysis of time-related data, and predictive modelling. Experience in programming preferred.	N/A
Dr Elaine Goosen	MEng (R) / PhD	High-performance asphalt for motorsport	The performance demands for motorsport surfacing differ from conventional applications. Can these mixes be refined to improve the balance of tyre performance vs skid resistance?	N/A
Dr Elaine Goosen	MEng(R) / PhD	Unconventional alternatives to improve the quality of unsuitable and marginal materials in pavement engineering	One of the most expensive aspects of road-building is the earthworks component. Substandard material that must be spoiled contribute immensely to this expense due to the costs of fuel. This project will have the freedom to identify unconventional additives, reclaimed or recycled materials to improve the performance of marginal or unsuitable material to reduce wastage and related expenditure.	N/A
Dr Elaine Goosen and Prof Riaan Combrinck	MEng (R) / PhD	Using coated aggregates to improve the granular layer of roads	A granular sub-base is used to increase the load carrying capacity of roads. This layer is composed of a high quality aggregate with a specific grading. This study should investigate the mechanical and durability properties of this granular layer if the aggregates are coated with a thin layer of reactive cementitious material.	Speak to lecturer for funding options
Dr Claudia Visagie & Dr Elaine Goosen	MEng(S) / MEng(R) / PhD	Road Markings and Autonomous Driving Systems	Given autonomous vehicles' dependence on road markings, and a general shift to technology-driven transport solutions, what role can and should technology play and/or what high end pavement markers should be considered and planned for to gear our South African roads for the future. With the as-is network readiness evaluation, a sound recommendation for the role out of the to-be situation can then be made to preempt the foreseeable obstacles. Programming with rasberry-pi likely possible.	N/A
Dr Claudia Visagie & Dr Elaine Goosen	MEng(S) / MEng(R) / PhD	Pavement and Autonomous Driving Systems	Given the 6 levels of autonomous vehicles, with level 0 being no driving automation and 6 full driving automation, and the anticipated role out for these in a developing country like South Africa, what type of preventative maintenance and/or planning should be undergone to gear our roads to preempt the pavement problems of the future. The recommendation could also be supplemented by considering the shift to Electric Vehicles (EVs) and their unique effect on pavement design.	Speak to lecturer for funding options
Dr Claudia Visagie	MEng(S) / MEng(R) / PhD	Are we doomed to drive on congested roads?	Given the fact that South Africa is the sixth African country with the largest population and the signifcance of urban sprawl, what options of congestion charging can and should be considered and planned for to alleviate congestion and improve travel time, The local e-toll project implemented under the Guateng Freeway Improvement Project (GFIP) could be benchmarked to steer the successful role out of the proposed solution/ recommendation.	N/A
Dr Claudia Visagie	MEng(S) / MEng(R)	The sweet spot between comfort and practicality - can Stellenbosch's land transport network accommodate the high surge of new developments.	Conduct a preliminary Traffic Impact Assessment (TIA) on the new development Newinbosch located on the R304. Balance findings with a SWOT analysis to make inferred recommendations with clear actionable goals to be achieved over the the course of 5 years.	N/A

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Dr Claudia Visagie	MEng(S) / MEng(R)	Putting Stellenbosch's rentable electric scooters under the spotlight.	Conduct a cost analysis to determine the break-even point for GONOW on Demand. Considerations include: upfront costs, maintenance costs, operating costs, and billing rates. Based on findings, hypothesize what the future (rates and applications) should look like.	N/A
Dr Claudia Visagie	MEng(S) / MEng(R)	When two becomes one - navigating between the dense cluster of Stellenbosch's Schools.	Conduct a traffic analysis on altering a congested dual roadway section's configuration to a one way road. Considerations include: peak period efficiency, flow to saturation ratios, travel time savings, operational execution and feasibility. The PTV transport planning and traffic simutlation software would likely be used.	N/A
Dr Claudia Visagie	MEng(S) / MEng(R)	Breaking the chains and envisioning a brighter future for South African freeways.	Conduct a feasibility study to determine the merit and viability of ramp metering in South Africa. Benchmark other prominent ramp metering solutions in the world and identify viable location(s) for local implementation. Conclude with role out road map & solution architecture.	N/A
Dr Claudia Visagie	MEng(S) / MEng(R)	Breaking the chains and envisioning a brighter future for South African freeways.	Local implementation of ramp metering has been tested and failed. Conduct a thorough evaluation of what went wrong and pave the road to success by learning from our mistakes. The specific South African demographics and our citizens virtues and behaviours would likely need to be investigated and understood to make a sound recommendation.	N/A
Prof Johann Andersen	Various projects for MEng(R)	Planning needs and application areas of Autonomous and Connected vehicles in South Africa	Linked with SARNAL research proposal on AV/ CV planning for South Africa.	
Prof Johann Andersen	Various projects for MEng(R)	Transport data visualisation	Data visualisation is an important step in making Big Data accessible and usable. Consider data processing for traffic data in South Africa, creating dashboard visulasations.	
Prof Marion SInclair	Various projects for MEng(R), MEng(S); PhD	Road safety	**Subthemes include**: Safety effects of road design standards Safety of road users at night Pedestrian safety Area-based road safety evaluations and recommendations Public Transport – improvements in efficiency and safety (various modes) Speed limit implications for safety Vulnerable road users. Specific topics to be developed in consultation between student and supervisor.	
Prof Marion SInclair	Various projects for MEng(R), MEng(S); PhD	Enhancing road users' experience	**Subthemes include**: Universal access and safety of road users Designing roads for people/ urban regeneration Promoting NMT Specific topics to be developed in consultation between student and supervisor.	
Prof Marion SInclair	Various projects for MEng(R), MEng(S); PhD	Transport equity	**Subthemes include**: Road-based crime analysis and prevention; Security impacts on road safety; Impacts of road insecurity on road user behaviour. Specific topics to be developed in consultation between student and supervisor.	
Prof Marion SInclair	Various projects for MEng(R), MEng(S); PhD	Road user security	**Subthemes include**: Road-based crime analysis and prevention; Security impacts on road safety; Impacts of road insecurity on road user behaviour. Specific topics to be developed in consultation between student and supervisor.	

Dr Megan Bruwer	Various projects for MEng(R), MEng(S); PhD	The impact of the built environment on sustainable transport behaviour	Develop understanding of international urban form that encourages sustainable transport solutions, for example ride-sharing, public transport, off-peak travel, etc. and evaluate how this would translate to a South African context. Examples of research questions:
			   - What steps should urban planners and transportation engineers take to promote urban form that encourages reduced private car usage and environmental impact of transport?
			   - How could we reform our parking strategies to maximum parking standards rather than minimum parking requirements, and what impact would this have on urban form and transport behaviour?	

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Dr Megan Bruwer	Various projects for MEng(R), MEng(S); PhD	Application areas of Floating Car Data in an African context	More work is needed to identify areas of transport planning and traffic engineering that can be improved through the application of FCD. Projects could look at LOS analysis of roads and intersections using FCD, evaluation of queue lengths from FCD, congestion tracking, etc,	
Dr Megan Bruwer	MEng(R)	The feasability of a new rail services supporting Stellenbosch Unviersity students and staff	Stellenbosch traffic congestion is well known, and is impacted greatly by the high cost of housing in Stellenbosch, which forces many Stellenbosch University students and staff to live in surrounding urban areas. Evaluate the feasibility of operating a dedicated passenger train between Wellington, Paarl, Stellenbosch and Eerste River. As part of this research, the interaction of rail with supporting infrastructure such as feeder networks and park 'n ride facilities should also be investigated.	A funding proposal is underway which may provide financial support for this study.
Dr Megan Bruwer	MEng(R)	Universal accessibility of South African rail services	Evaluate the level of accessibility of South African urban rail systems for public transport users of diverse abilities and backgrounds. Universal design principles should be investigated throughout the Cape Town metropolitan rail system, with comparison to international standards. Suggestions for implementable solutions should be made.	
Dr Megan Bruwer	MEng(R)/(S)	Variation of traffic in holidays towns in South Africa	Traffic varies greatly throughout the year in sleepy coastal towns in South Africa. This has led to an oversupply of traffic capacity for the majority of the year, and significant traffic congestion during holiday periods when the population of these popular holiday destinations explodes. Evaluate typical montly traffic growth factors for coastal towns and recomment the optimal design flow, related to the well used 30th highest hourly traffic volume. Use Floating Car Data to assist in this analysis.	
Dr Megan Bruwer	MEng(S)	AADT accuracy when evaluated from expansion factors	AADT is regularly estimated from a short-term traffic count and expansion factors determined elsewhere on the road network. Evaluate the accuracy of using expansion factors to estimate AADT, and suggest how long a coverage count should be to estimate a reasoable AADT with expansion factors.	
Dr Megan Bruwer	MEng(S)	Criteria for selecting expansion factors for AADT estimation	AADT is regularly estimated from a short-term traffic count and expansion factors determined elsewhere on the road network at a continuous count station. Evaluate a set of criteria from widely available Floating Car Data that can be used to select the a suitable continuous count station at which expansion factors can be generated, ensuring similar traffic patterns.	