Research in the Mechanics Division
Research Areas Include

- Human response to noise and vibration
- Dynamics
- Renewable and Sustainable Energy
- Materials Engineering
- Composite Materials
- Inflatable Structures
- Numerical Simulation of Complex Structures
- Numerical Design Optimization
  - Applications
  - Algorithm development
Faculty

Dr. Debby Blaine
Prof. Albert Groenwold

Dr. Annie Bekker
Prof. Wikus van Niekerk

Dr. Thorsten Becker
Prof. Gerhard Venter

Dr. Martin Venter
Ocean Energy Research

Wave Energy:
- Wave Energy Resource Studies
- Point Absorbers (Buoys)
- SWEC (Stellenbosch Wave Energy Converter)

Ocean Current:
- Agulhas Ocean Current
- Turbines and Shrouds
- Deployment & Recovery

Mean annual average wave power (kW/m)
MATERIAL ENGINEERING RESEARCH GROUP

- Qualification of 3D printed parts for Medical Implants and Aerospace components.
- Material performance investigation into energy materials.
- Fracture in Polycrystalline diamond.
- Collaboration with University of Cape Town, Central University of Technology and Oxford University (UK).

Contact Dr Thorsten Becker
tbecker@sun.ac.za
Vibration responses of Polar supply and research vessels in open water and ice

Travel to Antarctica or the Arctic
2 Potential bursaries available
(NRF R40k + R40k top-up fund)

Supervisors:
A. Bekker

• **Topic 1 (M / PhD): Multi-sensor decision aiding system for the SA Agulhas II** – Strain gauge instrumentation of full-scale ship shaft lines, operational measurements and Operational Modal Analysis.

• **Topic 2: Structural dynamics investigation of ships in water and ice** – Investigate a decision-aiding system for hull vibration monitoring on full-scale and model scale ships. Possible travel to international ice-tank facilities in Finland and Russia for collaborative work.

Work within an international consortium with Aalto University, The Finnish Metrological the National Department of Environmental Affairs, South Africa.

Possible internships in Germany / Finland / Russia / China
Hand-arm vibration monitoring for the operators of vibrating hand-held tools

- Conduct vibration exposure measurements for the operators of hand-operated vibrating tools on a mining site.
- Consolidate survey results into a database.
- Implement the REACTEC hand-arm vibration monitoring system to monitor hand-arm vibration exposure.
- Design / specify a cost-effective measurement system to monitor vibration exposure.
- Investigate the correlation between cost-effective vibration monitoring and state-of-the-art measurements.

Supervisors: A. Bekker & J. Muiyser

1 Potential bursary available (NRF + Richards Bay Minerals)
Powder Metallurgy for Titanium

Press-and-sinter

DMD: direct metal deposition

SLM/SLS: selective laser sintering

PIM: powder injection molding

- Improve material utilization
- Easily produce intricately shaped parts

Research needs:
- Develop titanium powder processes for manufacturing high value added parts
- Part of consortium with several other universities, industrial aerospace partners, Fraunhofer Institut, Chemnitz)

MScEng & PhD funding available
Numerical Design Optimization

Objective: Find the highest point
Design Variables: Position
Constraints: Stay inside the fences
Tyre Heat Generation/Distribution
Inflatable Structures

- Material characterisation
- Product development and testing
Concluding Remarks

• Mechanics division provide a wide range of exciting research possibilities
• Funding is available for most projects in the form of bursaries and research assistantships

Express possible interest as soon as possible
What is Mechanics?

Mechanics is the branch of physics concerned with the behaviour of physical bodies when subjected to forces or displacements, and the subsequent effect of the bodies on their environment.  

_Wikipedia_