



Geodesy Education and Postgraduate Training at TUT: Current Provision and Future Needs



Pillar 7: Human Capital Development

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● From SAGWG 2025 to 2026: The Human Capital Challenge



● What Pillar 7 highlighted in 2025

- Limited number of institutions teaching geodesy.
- Strength in GNSS, positioning and adjustment.
- Gaps in physical geodesy, gravity and geoid modelling.
- Limited postgraduate progression.
- Need for greater national coordination

● What this means for TUT in 2026

- TUT contributes to the national education pipeline.
- Current curriculum review tests depth and progression.
- Postgraduate pathways need deliberate strengthening.
- Some gaps require a shared national response

● Building geodetic capability across the TUT PQM



1

Diploma in Geomatics- (NQF 6)

- Technician foundation
- Coordinate systems and projections
- Levelling and height determination
- GNSS positioning
- Measurement, adjustment and error concepts

2

Advanced Diploma/Bachelor of Geomatics (NQF 7)

- Technologist foundation
- Satellite surveying
- Datums and reference systems
- Coordinate transformations
- Network adjustment and positioning quality

3

Postgraduate Diploma in Geomatics

- Professional level
- Advanced Satellite Surveying and Geodesy
- Advanced adjustment
- Higher-level geodetic theory
- Research preparation

4

Master of Geomatics and beyond

- Research-led specialist development
- Reference systems and frames
- Positioning and geodetic networks
- MSc / PhD research capability

The TUT pathway is designed to move from application to understanding, to advanced analysis, and ultimately to research capability.

● Curriculum design reality

- SAGC academic models define competencies across registration pathways and categories.
- TUT follows the Engineering Surveying pathway, with geodesy progressively embedded across qualification levels.
- Qualification design must also operate within DHET credit requirements and finite curriculum space.
- Specialist geodetic depth must therefore be carefully positioned across undergraduate and postgraduate study.

● Key point

South Africa needs deeper geodetic capability, but the answer is not an overloaded undergraduate curriculum. It is a stronger education pipeline across all levels of study.

● Postgraduate training: Where specialist depth can grow

1

Postgraduate Diploma in Geomatics (NQF 8)

- Professional and academic progression
- Satellite Surveying and Geodesy
- Advanced adjustment and research capability
- Bridge beyond undergraduate formation

2

Master of Geomatics > Doctoral pathway

- Research Master's under development
- Creates space for deeper geodesy-related research
- Supports progression to doctoral research

3

Research opportunities

- GNSS and precise positioning
- Reference systems and transformations
- Geodetic networks and adjustment
- Height systems and geoid-related research

4

Longer term pipeline

- PGDip → Master's → PhD
- Researchers, academics and high-level practitioners
- Shared supervision, expertise and facilities

Undergraduate study builds the professional foundation; postgraduate study provides space for deeper geodetic specialisation and research.

● Collaboration: Building capability beyond one institution

- Share specialist teaching and short-course expertise.
- Expand joint postgraduate supervision.
- Share access to national facilities, datasets, software and equipment.
- Align research with national geodetic priorities and operational needs.

● Key point

The opportunity is not to duplicate capability, but to connect and share the capability South Africa already has.

● Near term needs: Strengthening the Geodesy pipeline

- Strengthen vertical progression across the Engineering Surveying pathway.
- Build greater postgraduate depth in geodesy and research.
- Connect curricula to national priorities, infrastructure and data.
- Create clearer pathways from student → postgraduate researcher → specialist capability.

● Key point

The next step is not simply more geodesy content. It is a more deliberate pathway from foundational learning to specialist capability



From Curriculum to National Capability

South Africa's geodesy challenge is not only what universities teach, but how effectively education, postgraduate research and the national geodetic community connect to develop the expertise the country will need next.

Thank you



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