

Section A: Overview of the Research Project Proposal

1. Academic level (Masters or PhD): Doctorate - PhD (Physics)

2. Broad field of research: Research on an Engineering aspect of the Telescope

3. Title of research project

Optical Fibre Networks using Flexible Spectrum Technology for the SKA

4. Research project abstract/ summary

MeerKAT and SKA rely on optical fibre communication technology for transporting tremendous amounts of data. For example, the dishes of the SKA and aperture arrays will produce 110 times the current global Internet traffic. Transporting this data requires research into dense wavelength division multiplexed (DWDM) network technologies that are flexible, adaptive and self-optimizing. Wavelength division multiplexing refers to the transmission of multiple optical fibre wavelengths within a single optical fibre. Flexible spectrum refers to the fact that the channel wavelength assignment is not statically fixed, but is dynamically optimized in real time to ensure optimum network performance at all times. In order for these “self-driving” networks to function optimally, novel hardware and dynamic algorithms need to be identified and developed to perform critical tasks. Such tasks include wavelength assignment, signal routing, network restoration and network protection. This project focuses on developing, implementing and testing modulation formats, hardware technologies and algorithms for optimizing the operation of such networks. Nelson Mandela University has the best equipped optical fibre research lab in the country. Our students have the opportunity to travel and present at overseas conferences, as well as spend time on research visits abroad.

Section B: Supervisor Details

1. Primary Supervisor Details

a) Professor Tim Gibbon

b) Nelson Mandela University (Port Elizabeth, South Africa)

c) Email: Tim.Gibbon@mandela.ac.za

d) Student supervision record:

| South African Students | | Black | | Coloured | | Indian | | White | |
|------------------------|-------|--------|------|----------|------|--------|------|--------|------|
| Degree | Total | Female | Male | Female | Male | Female | Male | Female | Male |
| Masters | 5 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 2 |
| Doctoral | 2 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 |
| Postdoctoral | 3 | 0 | 0 | 0 | 3 | 0 | 0 | 0 | 0 |

| Non-South African Students (other African countries) | | Black | | Coloured | | Indian | | White | |
|--|-------|--------|------|----------|------|--------|------|--------|------|
| Degree | Total | Female | Male | Female | Male | Female | Male | Female | Male |
| Doctoral | 5 | 0 | 4 | 0 | 1 | 0 | 0 | 0 | 0 |
| Masters | 2 | 0 | 1 | 0 | 1 | 0 | 0 | 1 | 3 |
| Masters/MTech | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Postdoctoral | 3 | 0 | 3 | 0 | 0 | 0 | 0 | 0 | 0 |

| Non-South African Students (International) | | Black | | Coloured | | Indian | | White | |
|--|-------|--------|------|----------|------|--------|------|--------|------|
| Degree | Total | Female | Male | Female | Male | Female | Male | Female | Male |
| Undergraduate degree (four year) | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 |
| Masters | 4 | 0 | 1 | 0 | 1 | 0 | 0 | 1 | 3 |

(Full details of each student is uploaded as a separate attachment to the application)

Section C: Full Research Project Proposal

1. Research project abstract/ summary

MeerKAT and SKA rely on optical fibre communication technology for transporting tremendous amounts of data. For example, the dishes of the SKA and aperture arrays will produce 110 times the current global Internet traffic. Transporting this data requires research into dense wavelength division multiplexed (DWDM) network technologies that are flexible, adaptive and self-optimizing. Wavelength division multiplexing refers to the transmission of multiple optical fibre wavelengths within a single optical fibre. Flexible spectrum refers to the fact that the channel wavelength assignment is not statically fixed, but is dynamically optimized in real time to ensure optimum network performance at all times. In order for these “self-driving” networks to function optimally, novel hardware and dynamic algorithms need to be identified and developed to perform critical tasks. Such tasks include wavelength assignment, signal routing, network restoration and network protection. This project focuses on developing, implementing and testing modulation formats, hardware technologies and algorithms for optimizing the operation of such networks. Nelson Mandela University has the best equipped optical fibre research lab in the country. Our students have the opportunity to travel and present at overseas conferences, as well as spend time on research visits abroad.

2. Relevance of the research proposed to the priority areas of SARAQ, MeerKAT and the SKA

The research relates to “Big Data topics, including the development of hardware and middleware platforms.” – specifically technology required to transport Big Data between individual telescope subsystems and to make Big Data freely available to Astronomers and telescope end users. Optical networks to meet these Big Data requirements demand rely on complex technologies and networks, with thousands of individual network

components (transceivers, routers, wavelength selected reconfigurable add-drop multiplexers, optical amplifiers, etc.) distributed within optical networks spanning thousands of kilometers. The underpinning technologies and control algorithms for real time dynamic operation of these networks in terms of operations such as wavelength assignment, wavelength routing, network restoration and protection have not yet been fully developed or implemented.

3. Research work breakdown:

- **Year 1**

- 1) Background study on theory and operation of network components (reconfigurable optical add drop multiplexers, wavelength selective switches, optical transceivers etc.) and modulation formats (QPSK, DPQPSK, coherent etc.).
- 2) Background study on optical fibre network architectures, specifically relating to DWDM flex spectrum. This includes experimental work to gain expertise with equipment in the Nelson Mandela University lab.
- 3) Full review of algorithmic approaches: genetic algorithms, evolutionary algorithms, particle swarm optimization, ant colony optimization etc.
- 4) Publish novel and innovative work at relevant conferences and journals (SAICSIT, SATNAC, SAIP etc.).

- **Year 2**

- 5) Clear formulation of the control plane and hardware requirements as relating to future networks, MeerKAT and SKA.
- 6) Identify and improve the best technologies from 1) and algorithms from 3) most suited to the problem. This features proposing novel and hybrid solutions.
- 7) Design and build an experimental lab testbed reflecting a full flexible spectrum DWDM network architecture.
- 8) Publish novel and innovative work at relevant conferences and journals (SAICSIT, SATNAC, SAIP etc.).

- **Year 3**

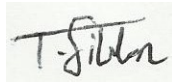
- 9) Using the experimental lab testbed developed, implemented the relevant technologies and algorithms and fully evaluate their performance and success.
- 10) Publish novel and innovative work at relevant conferences and journals (SAICSIT, SATNAC, SAIP etc.).
- 11) Write-up and submit.

4. Availability of required data / access to required equipment / availability of research facilities and other resources required (max 200 words)

The Nelson Mandela University has an extremely well equipped laboratory with cutting edge optical fibre research equipment. The equipment and expertise have been assembled over a period of seventeen years, with a proud history of producing MSc and PhD graduates. We collaborate closely with both local and international universities, as well as key industry partners such as Telkom. CISCO is a notable world leader and research partner in the area of flexible spectrum research. We also work closely with the SKA-SA Engineering team on the MeerKAT project in developing technologies implemented in the MeerKAT telescope. With the campus situated in Port Elizabeth beside the ocean on a nature reserve, Nelson Mandela University is a great opportunity for pursuing postgraduate studies.

Section D: Signatures

Supervisor signature, Date: 31 July 2018

A handwritten signature in black ink on a light-colored rectangular background. The signature appears to be 'T. Sibon' written in a cursive, slightly slanted style.

Timothy Gibbon, Student Supervision Record

Student Supervision Record

| South African Students | | Black | | Coloured | | Indian | | White | |
|------------------------|-------|--------|------|----------|------|--------|------|--------|------|
| Degree | Total | Female | Male | Female | Male | Female | Male | Female | Male |
| Masters | 5 | 1 | 1 | 0 | 1 | 0 | 0 | 0 | 2 |
| Doctoral | 2 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 |
| Postdoctoral | 3 | 0 | 0 | 0 | 3 | 0 | 0 | 0 | 0 |

| Non-South African Students (other African countries) | | Black | | Coloured | | Indian | | White | |
|--|-------|--------|------|----------|------|--------|------|--------|------|
| Degree | Total | Female | Male | Female | Male | Female | Male | Female | Male |
| Doctoral | 5 | 0 | 4 | 0 | 1 | 0 | 0 | 0 | 0 |
| Masters | 2 | 0 | 1 | 0 | 1 | 0 | 0 | 1 | 3 |
| Masters/MTech | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Postdoctoral | 3 | 0 | 3 | 0 | 0 | 0 | 0 | 0 | 0 |

| Non-South African Students (International) | | Black | | Coloured | | Indian | | White | |
|--|-------|--------|------|----------|------|--------|------|--------|------|
| Degree | Total | Female | Male | Female | Male | Female | Male | Female | Male |
| Undergraduate degree (four year) | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 |
| Masters | 4 | 0 | 1 | 0 | 1 | 0 | 0 | 1 | 3 |

| | |
|---|---------------------------|
| Title | Mr |
| Surname | Oladipo |
| Initials | J |
| Race | African |
| Gender | Male |
| Citizenship | South Africa |
| Institution | Nelson Mandela University |
| Level | Masters |
| Name of Degree/Diploma | MSc (Computer Science) |
| Title of Thesis | |
| Fulltime | Yes |
| Year of First Registration | 2016 |
| Status | Completed |
| Year of First Registration | 2016 |
| Year in which Degree was Awarded | 2018 |
| Year Supervised From | 2016 |
| Year Supervised To | 2018 |
| Supervisor | No |
| Co-Supervisor | Yes |

| | |
|---|---------------------------|
| Title | Dr |
| Surname | Wassin |
| Initials | S |
| Race | Coloured |
| Gender | Male |
| Citizenship | South Africa |
| Institution | Nelson Mandela University |
| Level | Doctoral |
| Name of Degree/Diploma | PhD (Physics) |
| Title of Thesis | |
| Fulltime | Yes |
| Year of First Registration | 2015 |
| Status | Completed |
| Year of First Registration | 2015 |
| Year in which Degree was Awarded | 2017 |
| Year Supervised From | 2015 |
| Year Supervised To | 2017 |
| Supervisor | Yes |
| Co-Supervisor | No |

| | |
|---|---------------------------|
| Title | Dr |
| Surname | Isoe |
| Initials | GM |
| Race | African |
| Gender | Male |
| Citizenship | Kenya |
| Institution | Nelson Mandela University |
| Level | Doctoral |
| Name of Degree/Diploma | PhD (Physics) |
| Title of Thesis | |
| Fulltime | Yes |
| Year of First Registration | 2015 |
| Status | Completed |
| Year of First Registration | 2015 |
| Year in which Degree was Awarded | 2017 |
| Year Supervised From | 2015 |
| Year Supervised To | 2017 |
| Supervisor | Yes |
| Co-Supervisor | No |

| | |
|---|---------------------------|
| Title | Dr |
| Surname | Bezuidenhout |
| Initials | L |
| Race | Coloured |
| Gender | Male |
| Citizenship | South Africa |
| Institution | Nelson Mandela University |
| Level | Postdoctoral |
| Name of Degree/Diploma | PhD (Geophysics) |
| Title of Thesis | |
| Fulltime | Yes |
| Year of First Registration | 2013 |
| Status | Completed |
| Year of First Registration | 2013 |
| Year in which Degree was Awarded | 2017 |
| Year Supervised From | 2013 |
| Year Supervised To | 2017 |
| Supervisor | No |
| Co-Supervisor | Yes |

| | |
|---|---------------------------|
| Title | Dr |
| Surname | Boiyi |
| Initials | D |
| Race | African |
| Gender | Male |
| Citizenship | Kenya |
| Institution | Nelson Mandela University |
| Level | Postdoctoral |
| Name of Degree/Diploma | Postdoc (Physics) |
| Title of Thesis | |
| Fulltime | Yes |
| Year of First Registration | 2017 |
| Status | Completed |
| Year of First Registration | 2017 |
| Year in which Degree was Awarded | 2017 |
| Year Supervised From | 2017 |
| Year Supervised To | 2017 |
| Supervisor | Yes |
| Co-Supervisor | No |

| | |
|---|--|
| Title | Dr |
| Surname | Boiyo |
| Initials | D |
| Race | African |
| Gender | Male |
| Citizenship | Kenya |
| Institution | Nelson Mandela Metropolitan University |
| Level | Doctoral |
| Name of Degree/Diploma | PhD (Physics) |
| Title of Thesis | |
| Fulltime | Yes |
| Year of First Registration | 2014 |
| Status | Completed |
| Year of First Registration | 2014 |
| Year in which Degree was Awarded | 2016 |
| Year Supervised From | 2014 |
| Year Supervised To | 2016 |
| Supervisor | Yes |
| Co-Supervisor | No |

| | |
|----------------------------------|---------------------------|
| Title | Miss |
| Surname | Dlamini |
| Initials | PP |
| Race | African |
| Gender | Female |
| Citizenship | South Africa |
| Institution | Nelson Mandela University |
| Level | Masters |
| Name of Degree/Diploma | MSc (Physics) |
| Title of Thesis | |
| Fulltime | Yes |
| Year of First Registration | 2015 |
| Status | Completed |
| Year of First Registration | 2015 |
| Year in which Degree was Awarded | 2016 |
| Year Supervised From | 2015 |
| Year Supervised To | 2016 |
| Supervisor | Yes |
| Co-Supervisor | No |

| | |
|----------------------------------|--|
| Title | Mr |
| Surname | Gravette |
| Initials | A |
| Race | White |
| Gender | Male |
| Citizenship | South Africa |
| Institution | Nelson Mandela Metropolitan University |
| Level | Masters |
| Name of Degree/Diploma | MSc (Computer Science) |
| Title of Thesis | |
| Fulltime | Yes |
| Year of First Registration | 2015 |
| Status | Completed |
| Year of First Registration | 2015 |
| Year in which Degree was Awarded | 2016 |
| Year Supervised From | 2015 |
| Year Supervised To | 2016 |
| Supervisor | No |
| Co-Supervisor | Yes |

| | |
|----------------------------------|--|
| Title | Mr |
| Surname | Chabata |
| Initials | V |
| Race | African |
| Gender | Male |
| Citizenship | Zimbabwe |
| ID / Passport / Unique Number | s212410180 |
| Institution | Nelson Mandela Metropolitan University |
| Level | Doctoral |
| Name of Degree/Diploma | PhD (Physics) |
| Title of Thesis | |
| Fulltime | Yes |
| Year of First Registration | 2012 |
| Status | Completed |
| Year of First Registration | 2012 |
| Year in which Degree was Awarded | 2015 |
| Year Supervised From | 2012 |
| Year Supervised To | 2015 |
| Supervisor | Yes |
| Co-Supervisor | No |

| | |
|----------------------------------|--|
| Title | Dr |
| Surname | Rotich |
| Initials | E |
| Race | African |
| Gender | Male |
| Citizenship | Kenya |
| Institution | Nelson Mandela Metropolitan University |
| Level | Postdoctoral |
| Name of Degree/Diploma | Postdoc (Physics) |
| Title of Thesis | |
| Fulltime | Yes |
| Year of First Registration | 2015 |
| Status | Completed |
| Year of First Registration | 2015 |
| Year in which Degree was Awarded | 2015 |
| Year Supervised From | 2015 |
| Year Supervised To | 2015 |
| Supervisor | Yes |
| Co-Supervisor | No |

| | |
|----------------------------------|--|
| Title | Mr |
| Surname | Rotich |
| Initials | E |
| Race | African |
| Gender | Male |
| Citizenship | Kenya |
| ID / Passport / Unique Number | s212238523 |
| Institution | Nelson Mandela Metropolitan University |
| Level | Doctoral |
| Name of Degree/Diploma | PhD (Physics) |
| Title of Thesis | |
| Fulltime | No |
| Year of First Registration | 2012 |
| Status | Completed |
| Year of First Registration | 2012 |
| Year in which Degree was Awarded | 2014 |
| Year Supervised From | 2012 |
| Year Supervised To | 2014 |
| Supervisor | Yes |
| Co-Supervisor | No |

| | |
|----------------------------------|--|
| Title | Mr |
| Surname | Wassin |
| Initials | S |
| Race | Coloured |
| Gender | Male |
| Citizenship | South Africa |
| Institution | Nelson Mandela Metropolitan University |
| Level | Masters |
| Name of Degree/Diploma | MSc (Physics) |
| Title of Thesis | |
| Fulltime | Yes |
| Year of First Registration | 2013 |
| Status | Completed |
| Year of First Registration | 2013 |
| Year in which Degree was Awarded | 2014 |
| Year Supervised From | 2013 |
| Year Supervised To | 2014 |
| Supervisor | Yes |
| Co-Supervisor | No |

| | |
|----------------------------------|--|
| Title | Mr |
| Surname | Gamatham |
| Initials | RRG |
| Race | Coloured |
| Gender | Male |
| Citizenship | Namibia |
| ID / Passport / Unique Number | s205062326 |
| Institution | Nelson Mandela Metropolitan University |
| Level | Doctoral |
| Name of Degree/Diploma | PhD (Physics) |
| Title of Thesis | |
| Fulltime | Yes |
| Year of First Registration | 2009 |
| Status | Completed |
| Year of First Registration | 2009 |
| Year in which Degree was Awarded | 2013 |
| Year Supervised From | 2011 |
| Year Supervised To | 2014 |
| Supervisor | No |
| Co-Supervisor | Yes |

| | |
|----------------------------------|----------------------------------|
| Title | Miss |
| Surname | Tatarczak |
| Initials | A |
| Race | White |
| Gender | Female |
| Citizenship | Poland |
| Institution | Technical University of Denmark |
| Level | Undergraduate degree (four year) |
| Name of Degree/Diploma | Bachelor thesis |
| Title of Thesis | |
| Fulltime | Yes |
| Year of First Registration | 2009 |
| Status | Completed |
| Year of First Registration | 2009 |
| Year in which Degree was Awarded | 2010 |
| Year Supervised From | 2010 |
| Year Supervised To | 2010 |
| Supervisor | No |
| Co-Supervisor | Yes |

| | |
|----------------------------------|---------------------------------|
| Title | Mr |
| Surname | Rodes Lopez |
| Initials | R |
| Race | White |
| Gender | Male |
| Citizenship | Spain |
| Institution | Technical University of Denmark |
| Level | Masters |
| Name of Degree/Diploma | MSc |
| Title of Thesis | |
| Fulltime | Yes |
| Year of First Registration | 2008 |
| Status | Completed |
| Year of First Registration | 2008 |
| Year in which Degree was Awarded | 2009 |
| Year Supervised From | 2009 |
| Year Supervised To | 2009 |
| Supervisor | No |
| Co-Supervisor | Yes |

| | |
|---|---------------------------------|
| Title | Mr |
| Surname | Jiménez Ruano |
| Initials | C |
| Race | White |
| Gender | Male |
| Citizenship | Spain |
| Institution | Technical University of Denmark |
| Level | Masters |
| Name of Degree/Diploma | MSc |
| Title of Thesis | |
| Fulltime | Yes |
| Year of First Registration | 2008 |
| Status | Completed |
| Year of First Registration | 2008 |
| Year in which Degree was Awarded | 2009 |
| Year Supervised From | 2009 |
| Year Supervised To | 2009 |
| Supervisor | No |
| Co-Supervisor | Yes |

| | |
|---|--|
| Title | Mr |
| Surname | Gamatham |
| Initials | RRG |
| Race | Coloured |
| Gender | Male |
| Citizenship | Namibia |
| ID / Passport / Unique Number | s205062326 |
| Institution | Nelson Mandela Metropolitan University |
| Level | Masters |
| Name of Degree/Diploma | MSc (Physics) |
| Title of Thesis | |
| Fulltime | Yes |
| Year of First Registration | 2007 |
| Status | Completed |
| Year of First Registration | 2007 |
| Year in which Degree was Awarded | 2008 |
| Year Supervised From | 2007 |
| Year Supervised To | 2008 |
| Supervisor | No |
| Co-Supervisor | Yes |

| | |
|---|---------------------------------|
| Title | Mr |
| Surname | Pawlik |
| Initials | M |
| Race | White |
| Gender | Male |
| Citizenship | Poland |
| Institution | Technical University of Denmark |
| Level | Masters |
| Name of Degree/Diploma | MSc |
| Title of Thesis | |
| Fulltime | Yes |
| Year of First Registration | 2007 |
| Status | Completed |
| Year of First Registration | 2007 |
| Year in which Degree was Awarded | 2008 |
| Year Supervised From | 2008 |
| Year Supervised To | 2008 |
| Supervisor | No |
| Co-Supervisor | Yes |

| | |
|---|---------------------------------|
| Title | Miss |
| Surname | Diaz Hernandez |
| Initials | T |
| Race | White |
| Gender | Female |
| Citizenship | Spain |
| Institution | Technical University of Denmark |
| Level | Masters |
| Name of Degree/Diploma | MSc |
| Title of Thesis | |
| Fulltime | Yes |
| Year of First Registration | 2007 |
| Status | Completed |
| Year of First Registration | 2007 |
| Year in which Degree was Awarded | 2008 |
| Year Supervised From | 2008 |
| Year Supervised To | 2008 |
| Supervisor | No |
| Co-Supervisor | Yes |

| | |
|-----------------------------------|---------------------------|
| Title | Miss |
| Surname | Dlamini |
| Initials | PP |
| Race | African |
| Gender | Female |
| Citizenship | South Africa |
| Institution | Nelson Mandela University |
| Level | Doctoral |
| Name of Degree/Diploma | PhD (Physics) |
| Title of Thesis | |
| Fulltime | Yes |
| Year of First Registration | 2016 |
| Status | Continuing |
| Year of First Registration | 2016 |
| Year Supervised From | 2016 |
| Year Supervised To | 2018 |
| Supervisor | Yes |
| Co-Supervisor | No |

| | |
|-----------------------------------|---------------------------|
| Title | Mr |
| Surname | Leburu |
| Initials | K |
| Race | African |
| Gender | Male |
| Citizenship | Kenya |
| Institution | Nelson Mandela University |
| Level | Masters |
| Name of Degree/Diploma | MSc (Physic) |
| Title of Thesis | |
| Fulltime | Yes |
| Year of First Registration | 2016 |
| Status | Continuing |
| Year of First Registration | 2016 |
| Year Supervised From | 2016 |
| Year Supervised To | 2018 |
| Supervisor | Yes |
| Co-Supervisor | No |

| | |
|-----------------------------------|---------------------------|
| Title | Ms |
| Surname | Ngugi |
| Initials | M |
| Race | African |
| Gender | Female |
| Citizenship | Kenya |
| Institution | Nelson Mandela University |
| Level | Masters/MTech |
| Name of Degree/Diploma | Masters (Engineering) |
| Title of Thesis | |
| Fulltime | Yes |
| Year of First Registration | 2018 |
| Status | Continuing |
| Year of First Registration | 2018 |
| Year Supervised From | 2018 |
| Year Supervised To | 2018 |
| Supervisor | No |
| Co-Supervisor | Yes |

| | |
|-----------------------------------|---------------------------|
| Title | Mr |
| Surname | Burdett |
| Initials | J |
| Race | White |
| Gender | Male |
| Citizenship | South Africa |
| Institution | Nelson Mandela University |
| Level | Masters |
| Name of Degree/Diploma | MSC (Computer Science) |
| Title of Thesis | |
| Fulltime | Yes |
| Year of First Registration | 2018 |
| Status | Continuing |
| Year of First Registration | 2018 |
| Year Supervised From | 2018 |
| Year Supervised To | 2018 |
| Supervisor | No |
| Co-Supervisor | Yes |

| | |
|-----------------------------------|---------------------------|
| Title | Prof |
| Surname | Wassin |
| Initials | S |
| Race | Coloured |
| Gender | Male |
| Citizenship | South Africa |
| Institution | Nelson Mandela University |
| Level | Postdoctoral |
| Name of Degree/Diploma | Postdoc (Physics) |
| Title of Thesis | |
| Fulltime | Yes |
| Year of First Registration | 2018 |
| Status | Continuing |
| Year of First Registration | 2018 |
| Year Supervised From | 2018 |
| Year Supervised To | 2018 |
| Supervisor | Yes |
| Co-Supervisor | No |

| | |
|-----------------------------------|---------------------------|
| Title | Dr |
| Surname | Isoe |
| Initials | G |
| Race | African |
| Gender | Male |
| Citizenship | Kenya |
| Institution | Nelson Mandela University |
| Level | Postdoctoral |
| Name of Degree/Diploma | Postdoc (Physics) |
| Title of Thesis | |
| Fulltime | Yes |
| Year of First Registration | 2018 |
| Status | Continuing |
| Year of First Registration | 2018 |
| Year Supervised From | 2018 |
| Year Supervised To | 2018 |
| Supervisor | No |
| Co-Supervisor | Yes |

| | |
|-----------------------------------|---------------------------|
| Title | Dr |
| Surname | Bezuidenhout |
| Initials | L |
| Race | Coloured |
| Gender | Male |
| Citizenship | South Africa |
| Institution | Nelson Mandela University |
| Level | Postdoctoral |
| Name of Degree/Diploma | Postdoc (Geophysics) |
| Title of Thesis | |
| Fulltime | Yes |
| Year of First Registration | 2018 |
| Status | Continuing |
| Year of First Registration | 2018 |
| Year Supervised From | 2018 |
| Year Supervised To | 2018 |
| Supervisor | No |
| Co-Supervisor | Yes |